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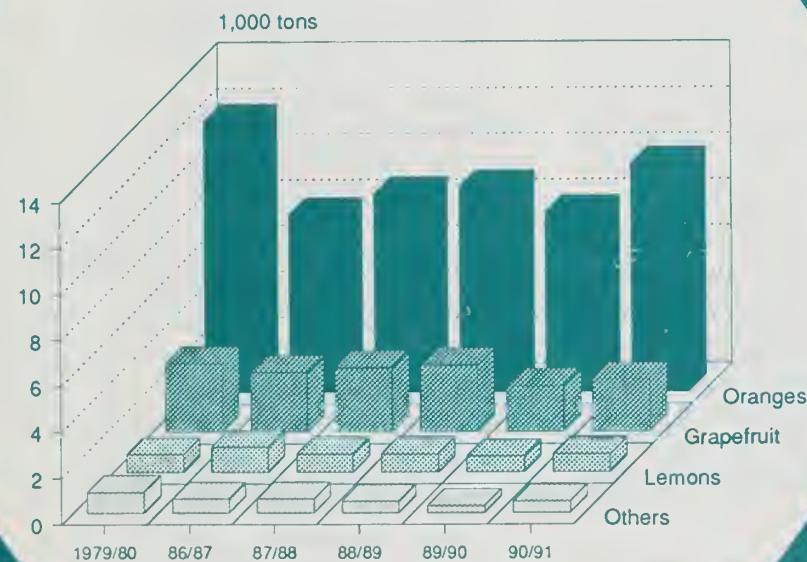
TRS-256
November 1990

Fruit and Tree Nuts

Situation and Outlook Report

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U.S. Citrus Fruit Production



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Fruit and Tree Nuts Situation and Outlook. Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture, November 1990, TFS-256.

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Approved by the World Agricultural Outlook Board. Summary released Thursday, November 15, 1990. The summary of the next *Fruit and Tree Nuts Situation and Outlook* is scheduled for release in March 1991. Summaries and text of Situation and Outlook reports may be accessed electronically. For details, call (202) 447-5505.

The *Fruit and Tree Nuts Situation and Outlook* is published 3 times a year and supplemented by a yearbook. Subscriptions are available from ERS-NASS, P.O. Box 1608, Rockville, MD 20849-1608; or call, tollfree, 1-800-999-6779 (weekdays, 8:30-5:00 ET). Rates: 1 year \$12, 2 years \$23, 3 years \$33. Please add 25 percent for subscriptions mailed outside the United States. Make checks payable to ERS-NASS. Single copies are available for \$8 each.

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Summary

Fruit Prices Mixed

The index of grower prices for all fruit weakened in October and fell below a year earlier. The decline between September and October was seasonally prompted by lower grower prices for grapefruit, oranges, apples, and pears. Lower prices for lemons, oranges, and tangerines stemmed from this season's larger supplies and provided downward pressure relative to a year ago. Larger citrus crops expected this season should continue to keep downward pressure on the index through the winter.

After reaching a record level in July, the Consumer Price Index (CPI) for fresh fruit weakened in August and September, but remained 8 percent above a year earlier. Lower retail prices for oranges and grapefruit are currently providing downward pressure on prices and are expected to continue doing so through the winter.

On the other hand, the CPI for processed fruit has remained relatively unchanged since reaching a record-high in July. This year's higher level has been induced primarily by the tight supplies of frozen concentrated orange juice (FCOJ) created by last December's freeze in Florida and by the record-high wholesale and retail FCOJ prices that followed. However, the index is expected to weaken in November as wholesale FCOJ price breaks announced since August reach the retail level. Also, the canned and dried fruit component of the processed fruit CPI, which has remained unchanged over the past 3 months, is not expected to provide any appreciable downward or upward pressure on the index.

U.S. Citrus Production To Rebound in 1990/91

U.S. citrus production (excluding grapefruit in California's "other areas")

is expected to reach 13.5 million shorttons, up 26 percent from last season—the largest crop in 6 years. This season's larger citrus crop forecast reflects expectations for increased production of all citrus commodities in Florida.

Florida's improved orange crop prospects and the forecasted larger juice yield are expected to result in a larger domestic orange juice pack in 1990/91. The larger pack will ease currently tight inventories and reduce the record-high wholesale and retail prices posted earlier this year for frozen concentrated, chilled, and canned orange juices. The larger pack from domestic oranges is also expected to reduce U.S. FCOJ import requirements this season, despite lower Brazilian export prices. Overall, the Florida Department of Citrus estimates that the total Florida orange juice pack will represent 70.4 percent of total expected U.S. orange juice supplies in 1990/91, compared with 48 percent last season.

In October, the 1990/91 California orange crop was forecast at 2.40 million short tons (64 million boxes), down 12 percent from last season. Smaller navel and Valencia orange crops are expected. However, fresh market orange supplies are expected to be adequate, despite the shorter California crop, because of greater production in Florida and Arizona this season.

U.S. grapefruit production (excluding California's "other areas") in 1990/91 is forecast up 31 percent, at 2.34 million short tons (56.6 million boxes), following last season's freeze-damaged crop. Florida production is forecast at 2.15 million short tons (50.5 million boxes), 41 percent greater than last season. In response to good demand for fresh market grapefruit, following last season's freeze-reduced supply and high prices,

a larger proportion of the Florida crop is expected to move into the fresh market. Exports are expected to account for over one-half of total fresh market grapefruit shipments in 1990/91.

Following three consecutive seasons of production shortfalls, the 1990/91 U.S. lemon crop is expected to be 764,000 short tons (20.1 million boxes), a rebound of 8 percent from last season and 1 percent from 1988/89. With larger domestic supplies this season, lower fresh market prices, and good demand for processing lemons, a larger proportion of the crop is expected to move into the processing market.

Smaller Noncitrus Fruit Crops Strengthen Prices

The forecast 1990 production of major noncitrus fruits indicates smaller crops for apples, grapes, peaches, olives, plums and prunes, and sweet and tart cherries. Relatively small increases are forecast for pears, nectarines, and apricots, while strawberry production for the major producing States is forecast up 6 percent. Prices for most noncitrus fruits are above last year's level, reflecting the smaller crops.

1990/91 U.S. Tree Nut Supplies Up 11 Percent

Large carryin stocks and above normal production have resulted in record supplies of all U.S. tree nuts except pecans. The marketable quantity of all U.S. tree nuts for 1990/91 will total 1.5 billion pounds (shelled basis), up 11 percent from the previous record of the 1989/90 season. However, these abundant supplies are available at a time when foreign tree nut supplies are lower. Consequently, U.S. domestic tree nut use and exports are expected to exceed previous record amounts.

Farm Bill Provisions Target Fruit and Tree Nut Crops

The 1990 farm bill includes several sections that will affect the U.S. fruit and tree nut industries beginning this month. The Secretary of Agriculture must complete a study within 18 months of enactment of the farm bill to determine the condition of the domestic fruit and vegetable industry. The requirement for the study was prompted by frequent recommendations from health organizations and the Surgeon General of the United States stating that fruits and vegetables are an essential part of a healthy diet and of vital importance to the nutrition of the U.S. population. The study's findings will be used to promote domestically produced fruit and vegetable products, to increase the public's awareness of the difficulties domestic producers experience in the production, harvesting, and marketing of these products, and to aid in the development of new technologies that domestic producers will need to meet increased demand for fruits and vegetables in the future. The study calls for interaction with other Government agencies, as deemed necessary by the Secretary of Agriculture.

The new bill also adds apples, nectarines, plums, kiwifruit, and pistachio nuts to the list of imported commodities that may be covered by Federal marketing order standards under Section 608e of the Agricultural Marketing Agreements Act of 1937. This will make it possible to require imported products to meet domestic U.S. grade, size, and quality standards.

The bill also extends the Targeted Export Assistance Program (now called the Market Promotion Program) for 5 years at a budgeted \$200 million per year. This program will have a positive effect on U.S. exports of many fruit and tree nut commodities.

Another provision calls for the establishment of a program in which the Secretary of Agriculture, in cooperation with the Commissioner of Food and Drugs, prescribes conditions under which food producers and sellers may label food products as "Grown in the United States" or as "Made of ingredients grown in the United States." Within 6 months of the enactment of the farm bill, a comprehensive review of all Federal country-of-origin food labeling requirements will be submitted to the House and Senate Agriculture Committees. The report will analyze the adequacy of the current federal country-of-origin food labeling requirements and make recommendations concerning the improvement of country-of-origin information available to consumers.

The Secretary of Agriculture is also required to study the levels and trends of pesticide use for producing perishable commodities in the United States and to determine the extent that Federal grades and standards impact pesticide use for cosmetic appearance. The research is also to determine the effects of reducing the emphasis of cosmetic appearance on pesticide use, alternative production practices, marketing costs, trade, and consumer preferences.

Additionally, the Secretary of Agriculture is to conduct a study to determine how USDA might best work with and support the U.S. wine and wine grape industry.

Other provisions enable the establishment of (1) research and promotion orders for mushrooms, limes, and pecans, (2) requirements that growers keep pesticide-use records, (3) a program of national standards and labeling of organic commodities, and (4) a ban on planting fruit and vegetable crops on program crop-acreage base.

Fruit Price Outlook

Grower and Retail Prices Weaken

Larger citrus supplies and weaker prices are putting downward pressure on the grower price index and Consumer Price Indexes for fresh and processed fruit.

Grower Prices for Citrus Fruit Under Pressure

The September index of grower prices for fresh and processing fruit jumped 9 percent from August and remained above a year earlier. While higher grower prices for limes, apples, peaches, and pears supported the index above year-ago levels, the August and September increases were induced by stronger prices for grapefruit, limes, oranges, apples, peaches, and pears, which offset weaker prices for lemons and strawberries. The index declined 6 percent in October to 190 (1977=100), 9 percent below a year earlier. The decline between September and October was prompted by a softening in grower prices for grapefruit, oranges, apples, and pears. Lower prices for lemons, oranges, and tangerines provided downward pressure relative to a year ago. The larger citrus crops expected this season should continue to keep downward pressure on the index through winter.

Consumer Price Index for Fresh Fruit Weakens

After reaching a record 176.6 (1982-84=100) in July, the Bureau of Labor Statistics' (BLS) Consumer Price Index (CPI) for fresh fruit weakened in August and September, but remained 8 percent above a year earlier. Lower retail prices for oranges and grapefruit are currently providing the downward pressure and are expected to continue doing so through the winter. However, higher marketing costs and other inflationary pressures are expected to provide upward pressure on retail prices for all fresh fruit.

Processed Fruit CPI Steady, But Expected To Soften

The CPI for processed fruit stood at 139.9 (1982-84=100) in September, relatively unchanged since July's record of 140.1, but 11.6 percent above a year

Figure 1
Prices Received by Producers

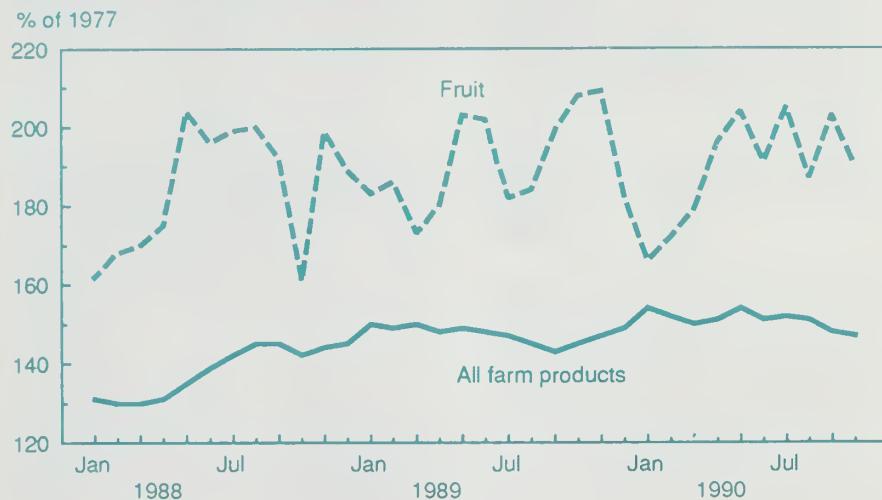


Figure 2
Fresh Fruit: BLS Consumer Price Index

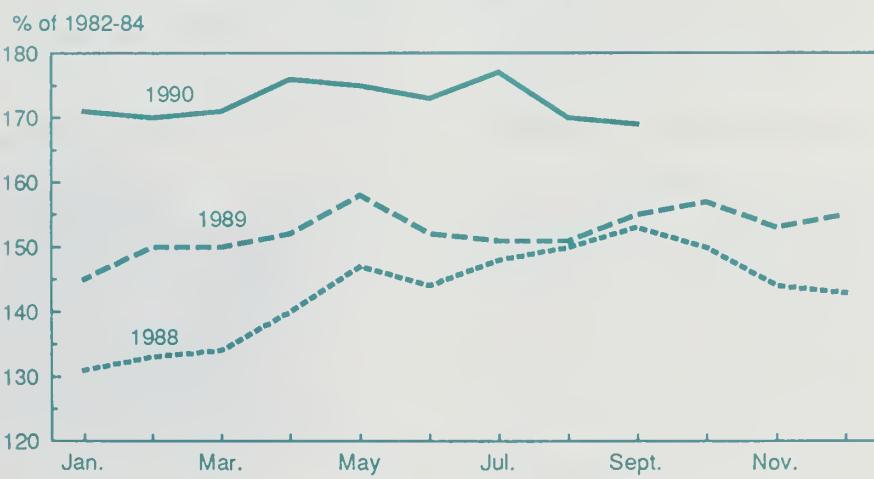
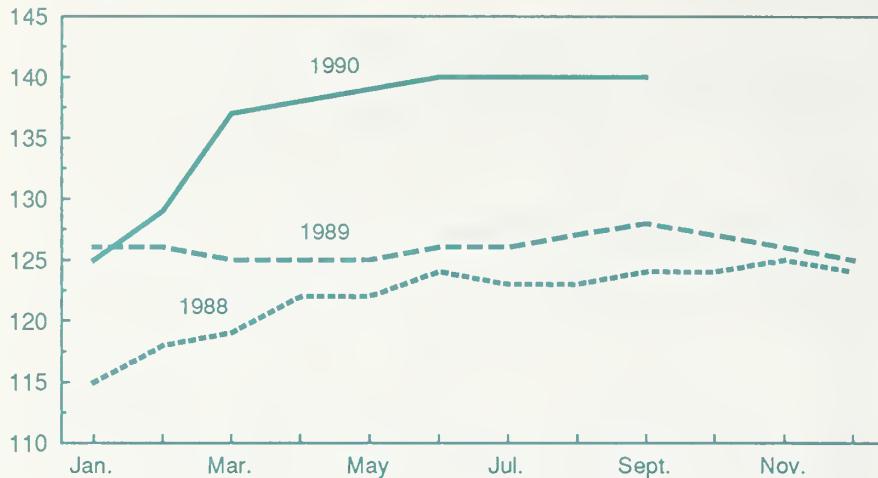


Figure 3
Processed Fruit: BLS Consumer Price Index

% of 1982-84



earlier. This year's higher level has primarily been induced by the tight supplies of frozen concentrated orange juice (FCOJ) following last December's freeze in Florida and the record-high wholesale and retail FCOJ prices that followed. However, the index is expected to weaken in November as wholesale FCOJ price breaks, announced by Florida processors and Brazilian exporters in August, reach the retail level. Moreover, the canned and dried component of the processed fruits CPI, which has remained unchanged over the past 3 months, is not expected to provide much change over the next few months.

Florida Commercial Citrus Acreage Rises

Florida's 1990 commercial tree inventory showed commercial citrus acreage up 5 percent since 1988 due to substantial new plantings and continued resetting in existing groves.

Reflecting the heavy planting activity of recent years that stemmed from strong demand for processing oranges and fresh grapefruit, the Florida Agricultural Statistics Service (FASS) bi-annual commercial tree inventory for 1990 showed commercial citrus acreage in Florida has increased 5 percent from 1988 to 732,767 acres in January 1990. The increase was due to substantial new plantings of citrus trees in the southern and east coast regions as well as continued resetting in existing groves throughout Florida, which have more than offset the removal of 85,858 acres over the past 2 years.

All-Orange Acreage Up 5 Percent

According to the FASS census, Florida all-orange acreage totaled 564,809, up 5 percent from 1988. Early and mid-

season varieties, including navels, account for 49 percent of the total orange acreage, followed by the late-season varieties, which include Valencias (44 percent), while the remaining 7 percent is unidentified. Acreage in Valencias, navels, and Hamlin increased between 1988 and 1990, but Hamlin acreage posted the largest gain (13 percent), followed by Valencias (10 percent), and navels (4 percent). Almost 71 percent of the total acreage is bearing; i.e., having trees 3-years-old and older.

Reflecting the trend toward higher density plantings in new groves, there was a 15 percent increase in orange tree numbers, which totaled 62.6 million in 1990. About 42 percent of these trees are 4-years-old or younger, while an additional 18 percent are between 5-

and 9-years-old, and 7 percent are between 10 and 14. The remaining 33 percent are 15 years of age and older. The large population of young trees is expected to substantially increase Florida's orange production in upcoming years.

Grapefruit Acreage Steadily Climbing

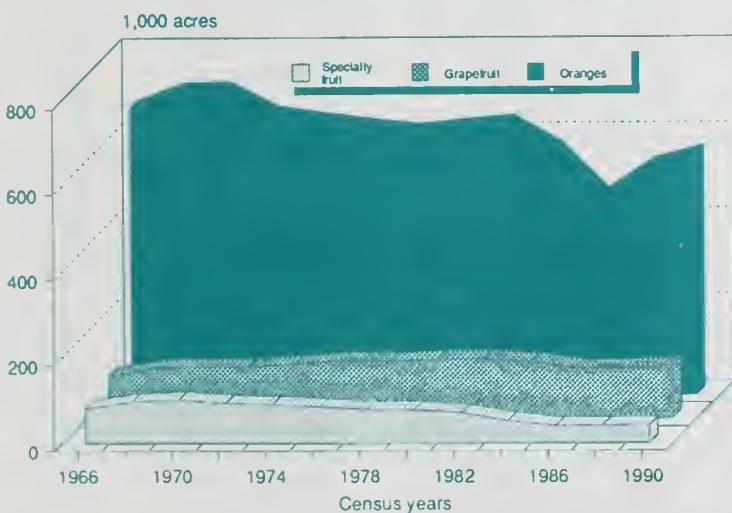
Continuing on an upward climb since the 1986 FASS tree census, Florida commercial grapefruit acreage totaled 125,300 in 1990, up 5 percent from 1988, but still 10 percent below 1980's record. However, the number of bearing and nonbearing grapefruit trees reached a record 11.2 million in 1990, up 11 percent from the 1988 census. Although the majority of Florida's grapefruit trees are in the older age groups, grapefruit plantings have been substantial in recent years. About 24 percent of the tree population is now 4-years-old or less, compared with 14 percent in 1988.

Specialty Acreage Moderately Up

Total Florida acreage in specialty citrus fruits (tangerines, tangelos, temples, limes, and lemons) also rose between 1988 and 1990. The increase was led by significant plantings of Sunburst and Honey tangerines and most tangelo varieties, which offset reduced acreage in Dancy tangerines, temples, lemons, and limes. Florida acreage in specialty citrus fruits totaled 42,658 in 1990, up 3 percent from the previous census year.

Figure 4

Florida Commercial Citrus Acreage



Citrus Production Expected To Rebound in 1990/91

Despite damage to the Florida and Texas citrus crops from last season's freeze, the 1990/91 U.S. citrus crop is expected to be the largest in 6 years.

USDA's first forecast for the 1990/91 citrus crop released in October placed total U.S. production (excluding grapefruit in California's "other areas") at 13.48 million short tons, up 26 percent from last season and the largest crop in

6 years. This season's larger citrus crop forecast reflects expectations for increased production of all citrus commodities in Florida. Because of the severe damage to Texas orange and grapefruit trees during the December

1989 freeze, the State currently does not expect to harvest a commercial crop this season. Consequently, Texas citrus production forecasts will not be made unless significant commercial volumes become available.

Table 1--Citrus fruit: Production, 1988/89-1989/90 and indicated 1990/91 1/

Crop and State	Boxes			Ton equivalent				
	Used		Indicated 1990/91	Used		Indicated 1990/91		
	1988/89	1989/90		1988/89	1989/90			
--1,000 boxes--		2/		--1,000 short tons--				
Oranges:								
Early, midseason, and Navel varieties 3/:								
Arizona	550	380	550	21	14	21		
California	34,000	44,100	40,000	1,275	1,654	1,500		
Florida	85,300	68,100	95,000	3,839	3,064	4,275		
Texas	1,200	1,050	6/	51	44	6/		
Total	121,050	113,630	135,550	5,186	4,776	5,796		
Valencias:								
Arizona	1,150	1,190	1,200	43	44	45		
California	24,900	29,000	24,000	934	1,087	900		
Florida	61,300	42,100	70,000	2,758	1,895	3,150		
Texas	650	155	6/	28	7	6/		
Total	88,000	72,445	95,200	3,763	3,033	4,095		
All oranges:								
Arizona	1,700	1,570	1,750	64	58	66		
California	58,900	73,100	64,000	2,209	2,741	2,400		
Florida	146,600	110,200	165,000	6,597	4,959	7,425		
Texas	1,850	1,205	6/	79	51	6/		
Total	209,050	186,075	230,750	8,949	7,809	9,891		
Grapefruit:								
Florida, all	54,750	35,700	50,500	2,326	1,518	2,147		
Seedless	51,400	34,300	49,000	2,184	1,458	2,083		
Colored	23,700	16,300	24,000	1,007	693	1,020		
White	27,700	18,000	25,000	1,177	765	1,063		
Other	3,350	1,400	1,500	142	60	64		
Arizona	1,950	2,200	2,200	63	70	70		
California	8,000	8,700	3,900	263	285	125		
Desert Valleys	3,500	3,700	3,900	112	118	125		
Other areas	4,500	5,000	4/	151	167	4/		
Texas	4,800	2,000	6/	192	80	6/		
Total	69,500	48,600	7/ 56,600	2,844	1,953	7/ 2,342		
Lemons:								
Arizona	3,800	2,900	3,100	144	110	118		
California	16,200	15,700	17,000	615	596	646		
Total	20,000	18,600	20,100	759	706	764		
Tangelos:								
Florida	3,800	2,950	3,100	171	132	140		
Tangerines:								
Arizona	650	600	650	25	22	24		
California	2,040	1,600	2,000	76	61	75		
Florida 5/	2,900	1,700	2,100	138	81	100		
Total	5,590	3,900	4,750	239	164	199		
Temples:								
Florida	3,750	1,400	3,100	169	63	140		
Limes:								
Florida	1,250	1,650	1,500	55	72	66		
Total citrus	312,940	263,175	319,900	13,186	10,899	13,542		

1/ The crop year begins with bloom of the first year shown and ends with completion of harvest the following year. 2/ Net content of box varies. Approximated averages are as follows: Oranges-California and Arizona, 75 lbs.; Florida, 90 lbs.; Texas, 85 lbs.; Grapefruit-California, Desert Valleys and Arizona, 64 lbs.; other California areas, 67 lbs.; Florida, 85 lbs.; Texas, 80 lbs.; Lemons, 76 lbs.; Tangelos, 90 lbs.; Tangerines-California and Arizona, 75 lbs.; Florida, 95 lbs.; and Temples, 90 lbs. 3/ Navel and miscellaneous varieties in California and Arizona. Early and midseason varieties in Florida and Texas, including small quantities of tangerines in Texas. 4/ The first forecast for California grapefruit "other areas" will be as of April 1, 1991. 5/ Florida "all tangerines" includes Sunburst tangerines beginning with the 1989/90 crop year. 6/ Due to the severe freeze of December 1989, the 1989/90 Texas citrus crops are virtually eliminated and forecast will not be issued this season unless sufficient commercial supplies become available. 7/ Excludes California grapefruit in "other areas."

Source: National Agricultural Statistics Service, USDA.

Domestic Orange Juice Pack Expected to Recover

Larger Florida orange crop prospects in 1990/91 are expected to ease tight domestic orange juice inventories and put downward pressure on wholesale and retail orange juice prices. Consumption is likely to rise.

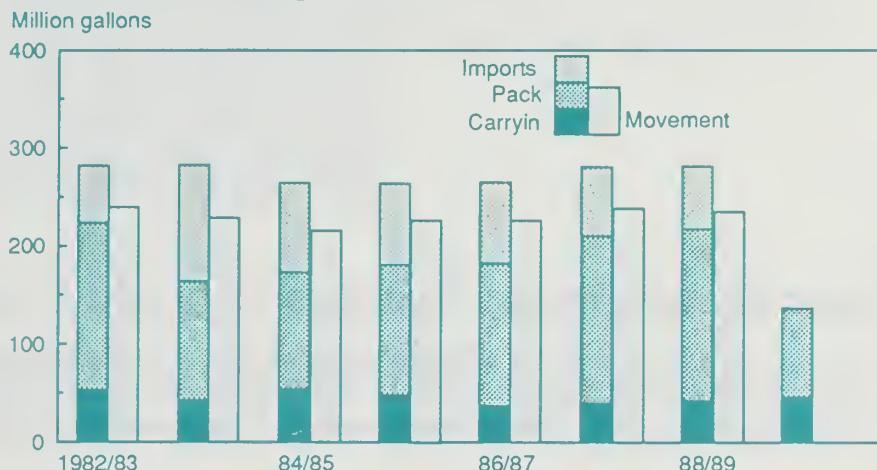
The first forecast for the 1990/91 Florida orange crop placed production at 7.43 million short tons, up 50 percent from 1989/90's freeze-damaged crop and 13 percent greater than the previous season's. The forecast was a surprise to many in the trade as it was generally believed that, although 1990/91 production would be larger than last season, it would not reach the level set in 1988/89 because of tree damage from last December's freeze. However, the 1990 Objective Measurement Survey and Tree Inventory, undertaken by USDA's National Agricultural Statistics Service and the Florida Agricultural Statistics Service, showed a large number of young trees (those under 5-years-old) reaching bearing age in the southern part of the State, where trees were relatively unaffected by the freeze. Moreover, good growing conditions throughout the year resulted in a heavy bloom and fruit set. Also, extremely early maturity has occurred because of the good growing conditions. This season's juice yield is expected to reach 1.52 gallons per box (42 degrees Brix), up 24 percent from the yield attained from last season's freeze-damaged fruit, and relatively unchanged from 1988/89's 1.54 gallons per box.

Larger Domestic FCOJ Supplies Expected

Florida's improved crop prospects and forecasted higher juice yield are expected to result in a larger domestic orange juice pack in 1990/91. The larger pack will ease currently tight inventories and reduce the record-high wholesale and retail prices for frozen concentrated, chilled, and canned orange juices posted earlier this year.

In October, the Florida Department of Citrus forecast the 1990/91 Florida orange juice pack at 956.8 million gal-

Figure 5
Florida Supply and Movement of Frozen Concentrated Orange Juice



lons (42 degrees Brix), up 76 percent from last season. Florida processors are expected to pack about 720 million gallons of frozen concentrated orange juice (FCOJ) during the season, almost 98 percent more than in 1989/90. Similarly, the 1990/91 Florida canned orange juice pack is expected to double from last season, at 6.8 million gallons (42 degrees Brix), while the Florida chilled orange juice pack is forecast to rise 31 percent to 230 million gallons of single-strength juice.

Overall, the Florida Department of Citrus estimates that the total Florida orange juice pack will represent 70.4 percent of total expected U.S. orange juice supplies in 1990/91, a significant improvement over the 48-percent share estimated for last season. Orange juice production in California and Arizona is expected to fall 20 percent from last season's 103.5 million gallons (single-strength), and account for 6.1 percent of total U.S. supplies in 1990/91. More orange juice was packed on the West Coast during 1989/90 because of the

record wholesale and retail prices that prevailed during the season.

Expect Smaller FCOJ Imports in 1990/91

At this time, the Brazilian Sao Paulo State is forecast to process 210 million boxes of oranges in 1990/91 (July-June), down 18 percent from last season's record. Despite lower juice production, Brazilian juice stocks are higher than expected due to sluggish U.S. FCOJ demand, in response to record-high prices. Recently, world FCOJ prices have dropped in response to a larger-than-expected 1990/91 Florida orange crop forecast and trade expectations for a record Brazilian orange crop in 1991/92. Despite prospects for larger Brazilian supplies and lower export prices in the months ahead, U.S. FCOJ imports are expected to decline in 1990/91 because of the increase in domestic orange juice availability and lower domestic prices. Consequently, Europe is expected to return as the largest market for Brazilian FCOJ exports during the season.

Table 2--Brazilian and Florida orange juice production,
1984/85-1989/90

Season	Brazil	Florida	Total
	--Million sse gallons		1/-
1984/85	1,091.7	567.1	1,658.8
1985/86	1,218.6	639.4	1,858.0
1986/87	839.7	708.4	1,548.1
1987/88	988.7	828.4	1,817.1
1988/89	992.8	888.6	1,881.4
1989/90	1,392.6	542.8	1,935.4
1989/90 2/	1,149.1	956.8	2,105.9

1/ SSE = single-strength equivalent.

2/ Estimate.

Sources: Agricultural Attaché, São Paulo, Brazil;
Florida Department of Citrus.

U.S. Orange Juice Demand To Rebound in 1990/91

U.S. orange juice consumption is expected to rebound in 1990/91 after record-high prices curtailed demand in 1989/90. According to the Florida Department of Citrus, retail prices averaged an estimated \$4.25 per gallon (single-strength-equivalent) in 1989/90, up 14 percent from the previous season. For 1990/91, the Department estimates retail orange juice prices will decline 11.5 percent to an average \$3.76 per gallon. The decline in retail prices is projected to increase 1990/91 retail orange juice sales, in retail outlets with annual sales in excess of \$4 million, by 18 percent from last season's 636.8 million gallons.

Fresh Market Orange Supplies Expected Adequate

Fresh market orange supplies should be adequate in 1990/91, despite expectations for a smaller California orange crop as Florida re-enters the market.

In October, the 1990/91 California orange crop was forecast at 2.40 million short tons (64 million boxes), down 12 percent from last season, but 9 percent above 1988/89. Smaller navel and Valencia orange crops are expected in the State. While the California navel crop is forecast to total 1.5 million short tons (40 million boxes), 9 percent smaller than last season's record crop, the State's Valencia crop is expected to be 17 percent smaller, at 900,000 short tons (24 million boxes).

Grower Fresh Market Prices Expected Lower

The larger Florida and Arizona crops expected in 1990/91 will help to offset smaller California orange production. In October, Florida's early and mid-season orange crop was forecast at 4.28 million short tons (95.0 million boxes), up 40 percent from last season, while the Valencia crop was forecast to rebound 66 percent from 1989/90's 1.90 million short tons (42.1 million boxes). Arizona's navel and Valencia crops are also expected to be 50 and 2 percent larger than last season's 14,000 short tons (550,000 boxes) and 44,000 short tons (1.2 million boxes).

Despite expectations for a smaller California orange crop, California growers are not expected to see appreciably higher returns this season because greater Florida and Arizona production will keep downward pressure on fresh market orange prices. California orange growers benefitted from the short fresh market conditions in the Eastern States that were created by last

December's freeze in Florida and Texas. This freeze damaged fruit quality, causing Texas growers to immediately suspend fresh market shipments and significantly curtailing Florida supplies. Two months into the 1990/91 season, grower on-tree prices for Florida fresh market navels averaged \$8.65

Figure 6 Fresh Oranges: Production and Season-Average Grower Prices, California

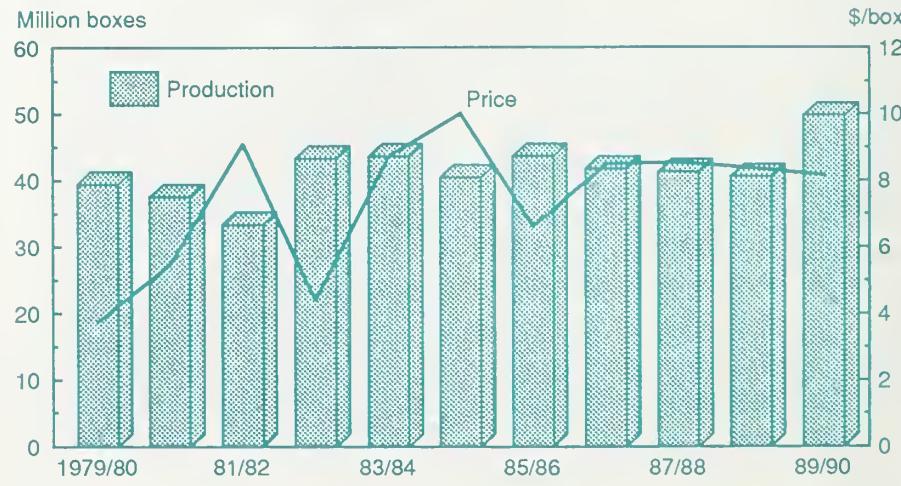
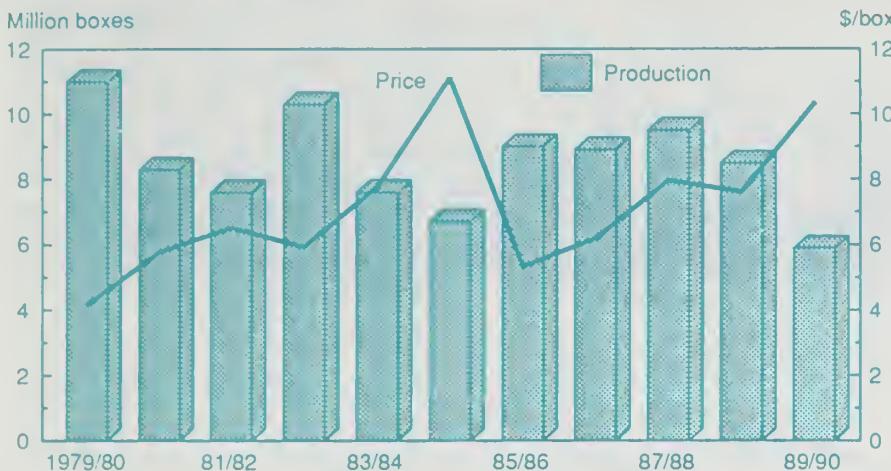


Figure 7

Fresh Oranges: Production and Season-Average Grower Prices, Florida



per box, compared with \$12.80 a year earlier. Similarly, October grower on-tree prices for the remaining supplies of California's 1989/90 Valencia crop, averaged 5 percent lower, at \$7.52 per box.

U.S. Grapefruit Production To Rebound in 1990/91

U.S. grapefruit production in 1990/91 is forecast up 37 percent following last season's freeze-damaged crop.

The 1990/91 U.S. grapefruit crop, excluding production in California's "other areas," is forecast at 2.34 million short tons (56.6 million boxes), 31 percent larger than last season, yet 13 percent smaller than 1988/89. Florida production, forecast at 2.15 million short tons (50.5 million boxes), will be 41 percent greater than last season if the forecast is realized. Production prospects in the California desert region and in Arizona, as of October, point toward a combined crop about 4 percent larger than last season's 188,000 short tons. Due to damage to Texas grapefruit trees inflicted by last December's freeze, forecasts for Texas production will not be made this season unless significant commercial volumes become available.

Larger Fresh Market Grapefruit Supplies Expected

In response to good demand for fresh market grapefruit in 1990/91 following last season's freeze-reduced supply and high prices, the Florida Department of Citrus estimates that 48 percent of the

Florida crop will move into the fresh market this season, compared with 36 percent in 1989/90. Although grower's fresh market prices are expected to range lower this season, Florida growers are likely to achieve higher returns with the increase in available supplies. Conversely, California and Arizona grapefruit growers who received record-high grower prices last season are expected to see lower returns in 1990/91 as Florida re-enters the market.

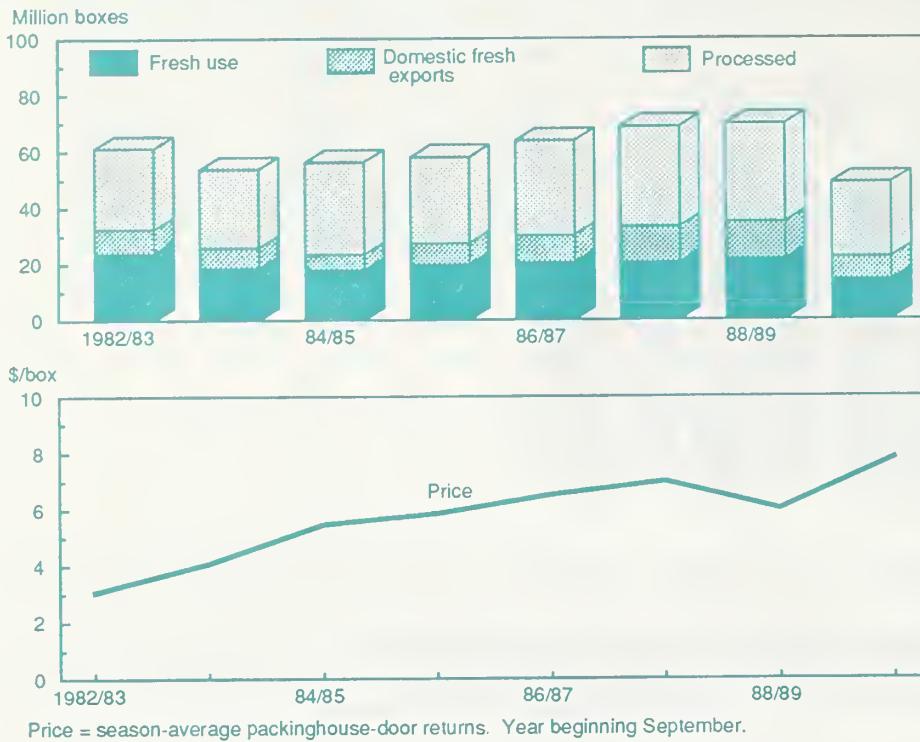
Export shipments of fresh grapefruit are expected to resume in 1990/91 after last December's freeze curtailed production of export-quality grapefruit as well as reducing its overall availability. Although demand in the domestic market is expected to be strong, exports should account for over one-half of total fresh market grapefruit shipments in 1990/91. However, as this summer's weather conditions in Florida caused fruit to mature early at smaller sizes than normal, demand in export markets preferring larger-sized grapefruit may be dampened.

Florida Grapefruit Juice Pack To Increase

Florida's larger grapefruit crop will result in an increased pack of frozen concentrated grapefruit juice (FCGJ) this season. In October, the Florida Department of Citrus estimated that Florida processors will utilize 42 percent of the total Florida grapefruit crop to pack 26 million gallons (40 degrees Brix) of FCGJ, 15 percent more than last season. The pack, combined with estimated carryin stocks of about 12 million gallons, should result in total Florida FCGJ availability of about 38 million gallons. This season's expected total availability is unchanged from 1989/90 because the larger pack is expected to offset smaller carryin stocks, the reverse of last season.

More fresh fruit will also be available for processing chilled (CGJ) and canned (CSSG) grapefruit juice products in 1990/91, although these two products are largely obtained by reconstituting

Figure 8
U.S. Grapefruit Production, Use, and Price



Price = season-average packinghouse-door returns. Year beginning September.

Larger 1990/91 U.S. Lemon Crop

Larger domestic lemon supplies in 1990/91 will put downward pressure on grower prices.

Following three consecutive seasons of production shortfalls, the 1990/91 U.S. lemon crop is expected to be 764,000 short tons (20.1 million boxes), a rebound of 8 percent from last season and 1 percent from 1988/89. This season's forecast reflects expectations for larger crops in both Arizona and California at 118,000 and 646,000 short tons, up 7 and 8 percent from last season. Movement through September was well ahead of 1989/90.

Strong Processing Demand

Because of smaller domestic supplies over the past four seasons, a larger proportion of the U.S. lemon crop has gone into the fresh market. In 1989/90, 66 percent of the crop went for fresh market use, compared with 61 percent in 1988/89 and 58 percent in 1987/88. With larger domestic supplies this season, lower fresh market prices, and good demand for processing lemons, a larger

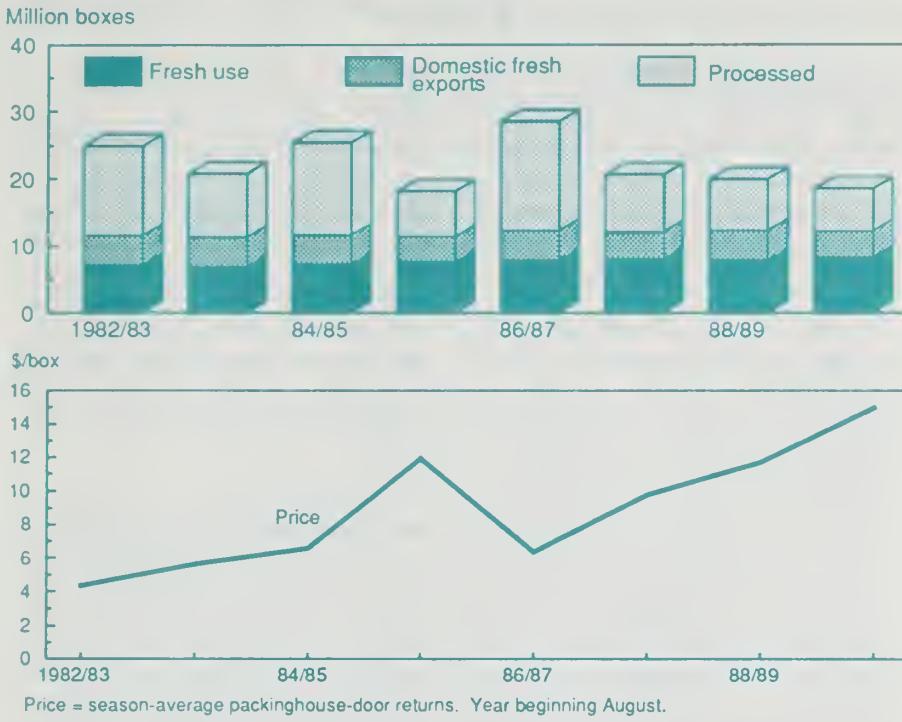
FCGJ. Heading into the 1990/91 season beginning in October, the Florida Citrus Processors Association reported CGJ carryin inventories of 3.1 million gallons, down 17 percent from last season. Similarly, CSSG carryin inventories were reported down 43 percent, at 799,396 million gallons, the lowest in recent years. The increased grapefruit juice supply in 1990/91 is expected to put downward pressure on prices and stimulate demand, which has been sluggish in light of last season's record wholesale and retail prices.

proportion of the crop is expected to move into the processing market.

Movement from the California/Arizona region was running 7 percent ahead of last season through late-October, with heavier shipments from all districts. As of late-October, shipments to domestic fresh and processing markets were up 4 and 59 percent, respectively, while exports lagged 9 percent behind year-earlier levels.

Figure 9

U.S. Lemon Production, Use, and Price



Grower Prices Range Lower

Heavier lemon supplies have put downward pressure on grower and f.o.b. prices this season, particularly for fresh market lemons. In October, on-tree prices received by growers for California fresh market lemons averaged \$19.55 per box, compared with \$21.98 a year ago. Grower prices for Arizona fresh market lemons are also lower, averaging \$17.15 per box in October, compared with \$20.68 a year earlier. On the other hand, on-tree prices for processing lemons are much improved in both States, reflecting strong processing demand this season.

Smaller Noncitrus Fruit Crops Strengthen Prices

Prices for most noncitrus fruits are above last year's, reflecting smaller crops of apples, grapes, peaches, olives, plums and prunes, and sweet and tart cherries.

The forecast 1990 production of major noncitrus fruits indicated smaller crops for apples, grapes, peaches, olives, plums and prunes, tart cherries, and sweet cherries. Relatively small increases are forecasted for pears, nectarines, and apricots, while cranberry and strawberry production in the major producing States are forecast up 6 percent. Total production of key noncitrus fruits is forecast down 8 percent in 1990. Prices for most noncitrus fruits are above last year, reflecting the smaller crops.

Apple Prices Strong

The final forecast for the 1990 U.S. apple crop is 9.47 billion pounds, down 5 percent from 1989. Hot summer weather in Washington, the leading apple-producing State, caused small fruit size and a 6 percent smaller crop than last year's. In the Central States, adverse spring weather and hail damage, combined with hot, dry weather in Missouri, resulted in a 1990 crop that is forecast 20 percent smaller than 1989's. Production in the Eastern States is forecast up 6 percent, but some lower quality fruit resulted from spring frost, scab, and cracking. Generally, lower quality

and strong processing demand should result in a larger portion of the crop going into processing uses this year.

The smaller crop and firm shipments through October 20 have moved fresh apple prices well above a year ago during the early months of the 1990/91 marketing season. Industry sources indicate that total stocks of apples for fresh and processing on November 1 were slightly above the past 5-year average, but down sharply from last year. Lower stocks, combined with strong domestic and export demand, will keep apple prices above a year ago and greatly improve the returns to growers this season. Demand has rebounded from the effects of the 1989 Alar scare.

U.S. Grape and Peach Crops Forecast Down

The August 1, 1990, forecast of the total U.S. grape crop is down 8 percent, with California raisin-type grapes down 12 percent, wine-type grapes down 4 percent, and table-type grapes down 3 percent. This year's crop had good-to-excellent quality for all grape types. Smaller fruit size in Washington, cold rains in Pennsylvania, and poor fruit

size in New York caused grape production in those States to be forecasted down 16, 22, and 5 percent, respectively, in 1990 from 1989 production. Retail prices for fresh Thompson Seedless grapes have been about 10 cents per pound higher during the May to September period this year, than for the same period in 1989.

Freeze damage occurred this spring in many East Coast States, particularly in South Carolina, and reduced the forecast for the total U.S. peach crop by 9 percent in 1990, compared to 1989. However, the clingstone and freestone peach crops in California were forecast up about 1 percent each. Excluding California clingstone peaches, the U.S. peach crop is forecast 16 percent smaller than in 1989. The smaller crop caused fresh peach prices to be above a year ago during the May-September marketing season.

1990 Sweet Cherry Crop Takes a Hard Hit From Weather

The 1990 crop year was not a good one for sweet cherries. Adverse weather reduced the forecasted total U.S. crop by 37 percent. A Memorial Day weekend rain devastated the crop in California, and May rains caused fruit splitting and lower yields in Washington. In 1989, a frost killed many trees in Montana and no significant commercial production was harvested that year. This frost also weakened the surviving trees, resulting in a relatively small 1990 sweet cherry crop in that State. In Oregon, the second leading State, the sweet cherry crop was not as adversely affected as in most other important cherry-producing States. However, Oregon's crop is still forecasted down 6 percent due to a light set and poor pollination weather last spring.

Table 3--U.S. noncitrus fruit: Total production, 1987-89, and indicated 1990

Commodity	1987	1988	1989	Indicated 1990
--1,000 short tons--				
Apples	5,371	4,566	4,983	4,736
Apricots	114	102	117	122
Cherries, sweet	215	186	194	122
Cherries, tart	180	118	137	112
Cranberries	170	204	187	199
Grapes	5,267	6,034	5,931	5,461
Nectarines	191	200	200	205
Olives	68	88	123	95
Peaches	1,191	1,307	1,167	1,061
Pears	938	861	917	939
Plums and prunes	979	738	1,012	702
Strawberries	559	590	532	563
Total	15,243	14,994	15,500	14,317

Source: National Agricultural Statistics Service, USDA.

Larger Pear and Strawberry Crops Forecasted

Fresh strawberry prices have been nearly the same in 1990 as in 1989 despite a forecasted 6 percent larger crop in the major producing States. Fresh strawberry shipments through October 25 have not kept pace with the

larger crop, but deliveries to processors and freezers are up sharply.

The final forecast for the U.S. pear crop is 939,000 tons, 2 percent above 1989's. Most of the increase was for Bartlett pears in California and Oregon. Production of pears (other than Bartlett) is forecasted to be about the same as in the

previous year. The all-pear prices for September and October of this year were above a year ago, despite the larger crop. Exports of fresh pears to Mexico jumped sharply in 1989 as Mexico relaxed some import restrictions. Continued exports to Mexico in 1990 will help strengthen pear prices for the 1990/91 marketing season.

Tree Nuts Outlook

Record U.S. Tree Nut Supplies for 1990/91

Abundant U.S. tree nut supplies should increase exports and domestic consumption to record levels. Lower foreign tree nut supplies will enhance U.S. marketing opportunities.

1990/91 U.S. Supplies Up 11 Percent

Large carryin stocks and above-normal production of most U.S. tree nut crops have resulted in record supplies. Only pecan supplies are smaller than last season's. The marketable quantity of all U.S. tree nuts will total 1.5 billion pounds (shelled basis), up 11 percent from the previous record in the 1989/90 season. However, these abundant supplies are available at a time when foreign tree nut supplies, especially Turkish hazelnuts and Spanish almonds, are lower. Also, the U.S. peanut crop is much smaller than last year, which may benefit tree nut crops. For these reasons, U.S. domestic use and exports of tree nuts are expected to exceed previous records.

Record Almond Supply Expected

Total production in 1990/91 by the world's leading producers of almonds is expected to total a record 418,100 metric tons (shelled basis). This is 11 percent higher than last season and 4 percent above the previous record in 1987/88.

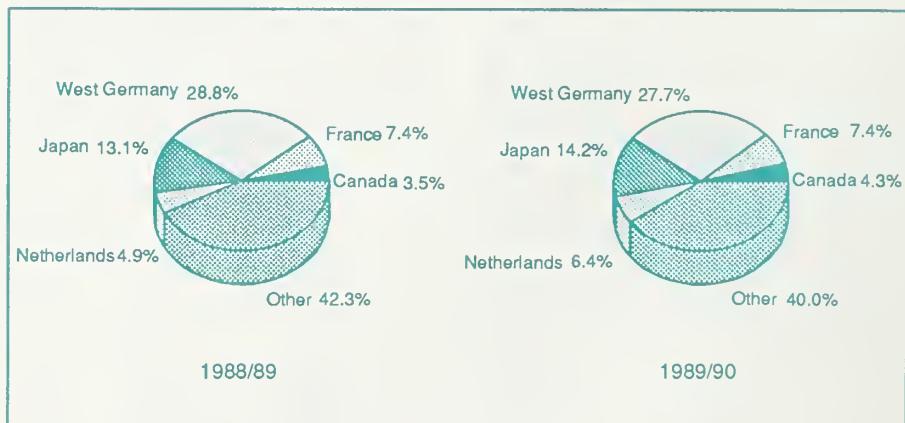
Almond production in Spain, Portugal, and Greece will decrease substantially from last year, but the U.S. and Italian crops will be much larger. The near-record production in the United States will more than offset the smaller foreign crops. In 1990/91, the U.S. crop will account for 71 percent of world almond production. The final forecast for the U.S. almond crop was 655 million pounds, shelled basis, up 34 percent from the 1989 crop and the second highest on record.

The previous 2 years witnessed declining U.S. almond production and supplies, yet domestic consumption and exports by the world's major producers increased. These trends in almond use

Figure 10
Almonds: Production and Season-Average Grower Prices



Figure 11
California Almonds: Exports by Destination



are expected to continue, with both total exports and domestic consumption for the major producing countries expected to increase 10 percent in 1990/91. Nevertheless, due to record production, world ending stocks in the 1990/91 marketing season are projected to increase 21 percent, with the United States holding most of these supplies. Almond prices may range moderately lower, due

to higher domestic supplies, but will also be enhanced by strong export demand.

World Hazelnut Production Down Substantially

Total 1990 production of hazelnuts (filberts) in the four major producing countries is forecast at 524,100 metric tons

Figure 12
Hazelnuts: Production and Season-Average Grower Prices

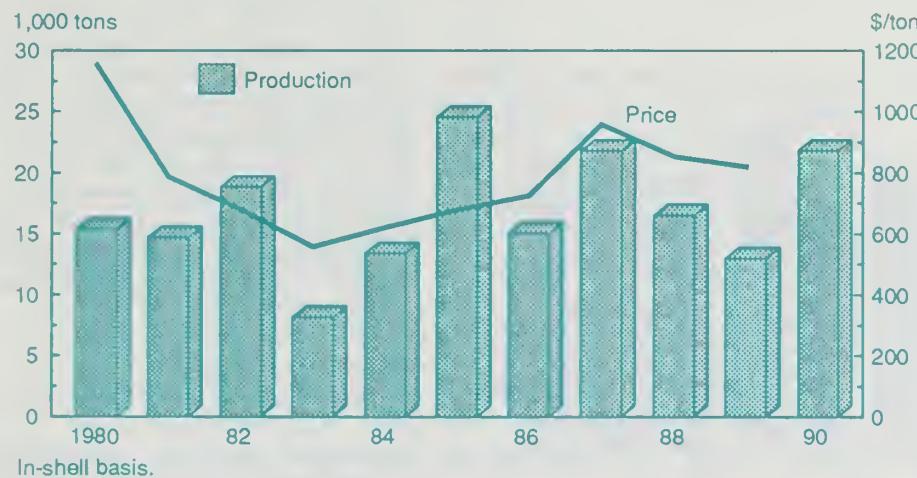
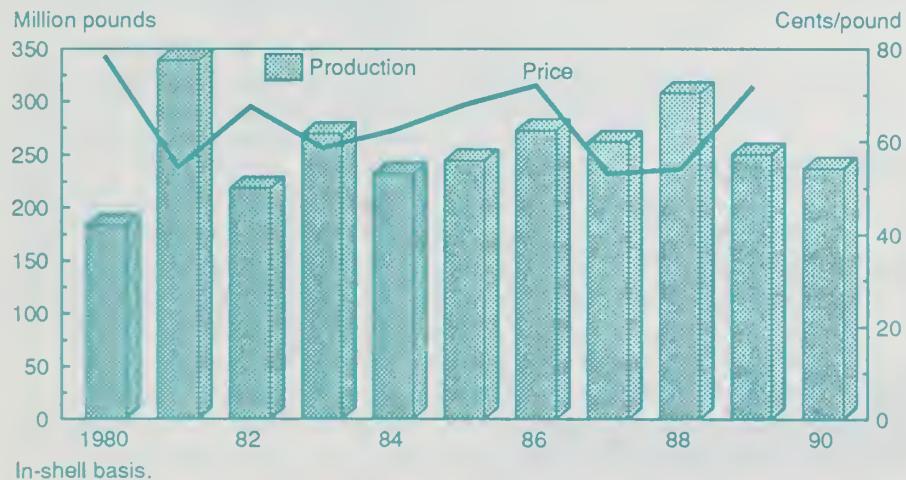


Figure 13
Pecans: Production and Season-Average Grower Prices



(in-shell basis), down 25 percent from last year's record production of 701,800 tons. This is due to lower production in the three leading hazelnut-producing countries, Turkey, Italy, and Spain. In the United States, the fourth largest producer of hazelnuts, production in 1990 is forecast at 21,800 short tons (in-shell basis). This is 68 percent larger than last season's small crop and is the third largest on record. Most processors report a good quality crop coming into the driers, despite a few more blanks than normal and some unexpected kernel shrinkage.

Pecan Supplies Smaller Than Last Year

The October 1 forecast for the U.S. pecan crop is 237 million pounds (in-shell basis), down 5 percent from last season's production. Insufficient rainfall has continued to affect pecan yields and nut sizes in the Southeast.

The smaller crop, combined with the lowest beginning stocks since 1981/82, will result in relatively small supplies for the 1990/91 marketing season. Opening prices are averaging well

above last year's. The shorter domestic supplies will be partially offset by larger imports from Mexico.

1990/91 World Walnut Supplies Higher

Walnut production in 1989/90 for the six top-producing countries (the United States, France, Italy, India, China, and Turkey) was 491,000 metric tons (in-shell basis). Total production in 1990/91 is forecast at 521,100 metric tons, 6 percent higher than last season's.

The 1990 California walnut crop is forecast at 225,000 short tons (in-shell basis), down 2 percent from last year. The 1990 crop forecast is equivalent to 204,120 metric tons or about 39 percent of the total for 6 leading countries. Last year, California's crop accounted for about 42 percent of world production. The in-shell-equivalent carryin stocks of California walnuts on August 1, 1990, were 63,166 short tons, compared with 58,968 tons on August 1, 1989. Thus, total U.S. supply in 1990/91 will be nearly the same as the prior season's.

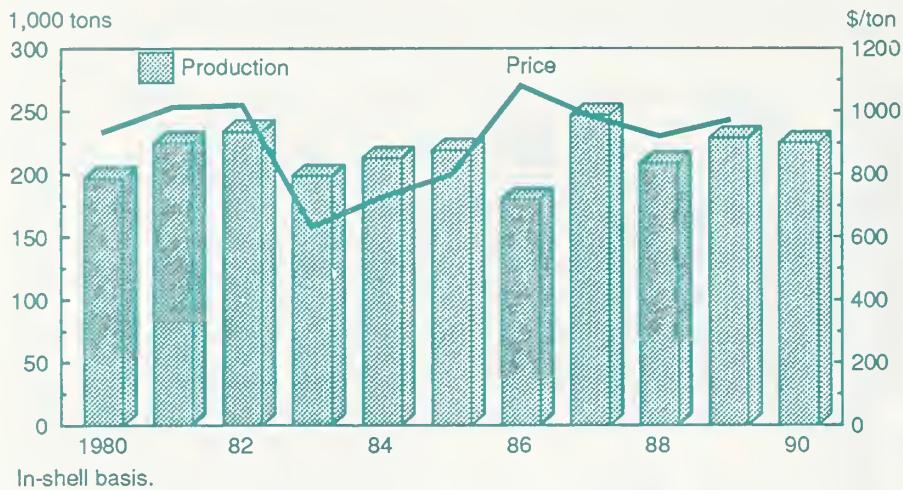
So far this season, in-shell and shelled walnut shipments to domestic and export outlets are running ahead of the 1989/90 season, when total disappearance of shelled walnuts, at 128 million pounds, was the highest on record, and in-shell disappearance, at 142 million pounds, was one of the highest on record. Strong demand is expected to continue in domestic and export markets. Walnut prices will be dampened in export markets by larger foreign supplies but enhanced in domestic channels due to smaller competing pecan supplies.

Record U.S. Pistachio Supply

California pistachio nut production in 1990 is forecast at 115 million pounds (in-shell basis). This is 22 percent higher than the previous record crop and nearly 3 times greater than 1989's small harvest. This large increase is primarily the result of the alternate-year bearing characteristic of the pistachio tree. However, bearing acreage also increased to 51,500 acres, 6 percent above 1989's. Grower and wholesale

Figure 14

Walnuts: Production and Season-Average Grower Prices



In-shell basis.

prices are expected to fall from 1989 levels because of much larger supply.

The U.S. supply in 1990/91 will be approximately 129 million pounds, including 14-million pounds carried over from the 1989/90 season. Both domestic consumption and exports of pistachios are expected to continue trending up. Pistachio supplies in 1990/91 for the five leading countries, excluding Iran, will total about 115,000 metric tons (in-shell basis), up 9 percent from last season.

Macadamia Supplies Continue Upward

Supplies of macadamia nuts from the United States and other leading world producers are expected to continue to increase in the 1990's to meet expanding demand. Consumer demand is making strong gains in the Japanese, American, and other developed-country markets.

Last year, Hawaiian macadamia production reached nearly 51 million pounds, 11 percent more than the previous record crop. Production for 1990 has not been officially forecast but the trend projection indicates it may hit 55 million pounds. Contracted grower prices are expected to remain relatively unchanged despite large domestic and foreign supplies.

Pistachios: Production and Season-Average Grower Prices



In-shell basis.

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Table 4—U.S. monthly average price indexes for fruits, 1988-90

Items	Years	-1977=100--										
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	
Grower prices:												
All fruits	1988	162	168	170	175	204	196	199	200	192	161	189
Fresh fruits	1989	183	186	173	180	203	182	184	199	199	208	182
	1990	166	172	179	196	204	191	187	203	190	190	180
Fresh fruits	1988	174	181	184	190	221	211	212	202	165	209	198
1989	192	195	180	189	216	214	190	193	209	221	219	188
1990	169	171	185	207	216	202	218	196	214	198		
Producer price index:												
Fresh fruits--	1988	109.2	104.2	106.8	102.7	113.6	112.2	117.7	110.3	119.9	125.1	119.9
	1989	107.8	110.0	113.5	104.5	112.5	115.4	114.1	107.3	113.3	110.8	107.4
	1990	103.1	112.0	112.5	105.4	112.6	114.7	132.2	118.3			
Citrus fruits	1988	131.6	130.1	127.9	128.0	144.1	150.3	152.0	151.8	172.0	143.2	121.3
	1989	118.5	116.8	119.1	115.7	132.9	141.4	142.9	149.9	144.9	141.4	131.2
	1990	133.5	144.1	152.5	143.4	141.1	160.1	163.5	164.0			
Other fruits	1988	101.1	94.9	99.2	93.5	102.6	98.5	105.3	95.3	108.5	90.1	118.6
	1989	103.9	111.8	111.4	100.5	101.5	105.1	101.2	92.6	101.9	101.9	119.3
	1990	92.1	100.4	98.1	92.6	98.4	102.9	101.9				98.9
Canned fruits and juices--	1988	118.9	119.4	119.5	119.7	119.9	119.8	120.2	120.4	120.5	120.6	122.4
	1989	121.8	121.9	121.8	122.0	122.1	122.5	123.4	123.3	123.2	122.8	123.4
	1990	123.9	126.6	127.5	127.6	127.7	127.6	127.3	127.1			
Canned fruits	1988	113.8	114.0	113.8	113.7	114.2	114.1	114.9	114.9	114.8	115.2	118.8
	1989	117.5	119.4	119.4	119.6	119.6	119.1	121.1	120.7	120.4	119.3	120.1
	1990	120.3	120.3	121.0	121.0	121.1	120.9	121.3	120.5			
Canned fruit juices	1988	124.2	125.0	125.3	125.8	125.6	125.6	126.0	126.3	126.2	126.3	126.6
	1989	124.5	124.9	125.0	125.9	125.9	125.5	126.6	126.8	126.8	126.9	127.4
	1990	128.2	133.0	133.9	134.1	134.4	134.3	133.7				
Frozen fruits and juices--	1988	125.4	130.2	131.1	130.1	130.9	131.8	130.4	130.8	130.7	129.6	128.6
	1989	127.3	122.1	121.1	119.6	123.7	128.2	129.0	129.1	127.4	125.6	119.9
	1990	128.6	147.0	147.8	145.9	146.1	146.2	146.3	146.6			
Frozen fruits	1988	116.4	116.7	116.6	116.7	116.7	117.6	116.9	117.0	117.1	116.5	116.3
	1989	116.2	117.4	117.0	117.7	116.9	116.9	118.3	118.4	116.9	115.2	109.9
	1990	117.9	134.8	135.6	133.1	133.1	134.0	134.1	134.1			
Frozen juices	1988	126.3	131.9	133.0	131.7	132.8	133.6	132.1	132.5	132.3	131.2	130.1
	1989	128.5	122.1	121.0	119.2	124.2	129.5	130.2	130.3	128.6	126.7	120.9
	1990	129.7	148.4	149.2	147.3	147.4	147.6	147.6	147.9			
Dried	1988	97.8	97.8	97.9	97.9	99.3	99.2	99.3	99.3	99.8	97.4	100.7
	1989	101.1	101.1	101.9	102.9	102.3	102.8	103.3	103.3	105.4	103.4	106.2
	1990	106.9	106.9	106.9	106.4	105.2	105.2	104.9	104.9			
Consumer price index:									-1982-84=100--			
Fresh fruits	1988	130.7	132.6	133.8	139.9	146.6	143.6	147.8	150.1	153.3	149.7	144.3
	1989	145.4	150.0	149.5	152.4	158.1	151.7	150.6	151.4	156.6	152.7	143.2
	1990	171.4	170.3	171.1	175.7	174.9	173.2	176.6	169.5	168.7		154.8
Processed fruits	1988	115.1	118.0	119.4	122.1	121.8	123.5	123.0	123.4	123.8	124.3	124.4
	1989	125.6	125.5	124.7	124.6	125.1	125.6	126.0	126.9	127.8	126.3	125.2
	1990	125.1	129.4	136.7	138.1	139.2	140.1	140.1	140.0	139.9	127.1	
Frozen fruit and juices	1988	115.4	118.9	120.4	123.7	123.2	125.3	124.7	124.9	125.3	126.0	126.2
	1989	127.5	127.1	126.0	125.6	126.4	126.7	126.7	128.1	129.2	128.4	127.5
	1990	125.9	134.4	140.4	142.3	143.8	144.8	144.5	144.3	144.2		126.3
Canned and dried fruits	1988	112.4	113.2	113.9	114.5	114.6	115.4	115.0	116.3	116.5	116.4	115.9
	1989	117.0	117.7	118.2	118.9	119.7	118.9	119.7	120.0	120.5	120.7	119.6
	1990	120.6	121.2	121.2	121.0	120.9	121.4	122.4	122.5	122.5		

Sources: National Agricultural Statistics Service, USDA and Bureau of Labor Statistics, U.S. Department of Labor.

Table 5--U.S. average monthly price received by growers, 1988-90

Items	Units	Years	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Noncitrus fruits:														
Apples, fresh	\$/lb.	1988 1989 1990	0.111 0.181 0.125	0.129 0.180 0.130	0.125 0.166 0.129	0.110 0.144 0.133	0.109 0.135 0.131	0.104 0.108 0.126	0.228 0.159 0.184	0.277 0.168 0.204	0.237 0.143 0.194	0.185 0.143 0.265	0.175 0.134 0.122	
Pears, fresh	\$/tons	1988 1989 1990	144.00 336.00 349.00	212.00 362.00 389.00	227.00 368.00 420.00	249.00 350.00 415.00	437.00 397.00 469.00	527.00 491.00 463.00	365.00 480.00 430.00	327.00 366.00 288.00	381.00 334.00 389.00	396.00 348.00 373.00	348.00 367.00 344.00	
Peaches, fresh	\$/lb.	1988 1989 1990	-- -- --	-- -- --	-- -- --	-- -- --	-- -- --	0.354 0.266 0.281	0.193 0.196 0.295	0.181 0.223 0.295	0.219 0.266 0.318	-- -- 0.320	-- -- 0.320	
Strawberries, fresh	\$/lb.	1988 1989 1990	0.800 0.830 0.980	0.763 0.935 1.030	0.588 0.677 0.768	0.409 0.448 0.508	0.499 0.350 0.358	0.454 0.560 0.452	0.504 0.311 0.402	0.550 0.350 0.600	0.600 0.650 0.600	0.700 0.950 0.950	1.600 1.750 1.200	
Citrus fruits 1/:														
Oranges-- Fresh	\$\box	1988 1989 1990	7.59 6.91 8.65	6.82 6.18 8.32	6.96 6.58 7.71	7.81 6.88 7.32	11.02 8.71 9.63	11.47 9.90 9.63	9.62 9.76 8.30	8.82 9.76 6.72	9.22 9.96 7.93	6.20 9.55 7.93	9.06 8.38 8.38	
Processing	\$\box	1988 1989 1990	6.22 6.45 4.50	6.55 6.09 4.83	6.81 5.09 5.37	7.74 7.39 7.16	8.37 8.33 7.01	8.28 8.17 3.13	0.50 0.54 3.35	0.50 0.52 3.35	0.50 1.70 3.35	0.51 1.56 2.28	3.62 2.47 2.47	
All	\$\box	1988 1989 1990	6.43 6.51 4.95	6.59 6.45 5.52	6.87 6.26 6.04	7.76 7.29 7.20	8.79 8.39 7.84	8.78 8.51 7.15	6.47 7.27 6.02	5.44 6.52 5.07	5.56 6.54 5.31	3.39 6.29 4.48	6.15 6.28 5.75	
Grapefruit-- Fresh	\$\box	1988 1989 1990	6.40 5.41 10.86	6.55 5.12 12.00	6.17 5.11 13.33	5.89 5.80 12.71	6.11 6.22 14.36	6.09 6.58 14.22	8.49 9.23 10.84	9.06 10.62 11.08	9.23 10.24 8.67	6.54 7.78 8.03	5.97 7.70 9.20	
Processing	\$\box	1988 1989 1990	4.65 3.14 2.99	4.80 3.24 3.62	4.68 3.26 3.82	4.19 2.76 2.99	2.62 2.04 0.75	-0.43 -0.04 -0.25	-0.41 -1.14 -0.34	-0.39 -1.22 -0.38	-0.38 -0.35 -0.35	0.83 1.13 1.12	2.73 1.66 2.21	
All	\$\box	1988 1989 1990	5.56 4.41 5.04	5.45 4.00 5.50	5.10 3.84 7.35	5.02 4.26 7.57	4.74 4.35 7.82	3.52 3.68 8.74	4.93 5.91 6.35	5.46 6.75 6.44	5.26 7.81 7.22	7.33 6.01 6.51	5.39 5.87 5.54	
Lemons-- Fresh	\$\box	1988 1989 1990	6.70 9.39 13.11	7.95 10.58 15.32	10.91 12.30 15.32	11.52 13.50 17.04	13.04 16.20 17.44	17.04 18.80 19.24	19.26 20.20 19.94	22.10 21.54 16.28	19.30 23.06 15.10	14.55 23.06 18.90	11.15 21.82 15.71	
Processing	\$\box	1988 1989 1990	-2.04 -0.99 0.22	-2.04 -0.97 0.32	-2.04 -0.92 0.36	-2.04 -0.90 0.36	-2.04 -0.88 0.36	-2.04 -0.88 0.44	-2.04 -0.88 0.50	-2.18 -0.80 0.70	-2.20 -0.75 0.57	-2.22 -0.74 0.57	-0.84 -0.46 -0.46	
All	\$\box	1988 1989 1990	1.62 4.29 8.84	2.27 4.75 9.70	5.91 5.88 10.07	6.56 8.05 11.10	8.04 11.99 12.20	12.09 14.97 12.97	13.42 15.60 13.33	16.12 16.70 10.48	12.20 17.76 10.34	7.76 14.91 11.68	5.76 9.25 6.90	
Tangerines-- Fresh	\$\box	1988 1989 1990	14.77 18.33 24.98	17.21 17.44 22.83	16.90 15.41 14.59	18.46 14.33 13.72	13.15 11.46 14.22	9.82 11.46 --	-- -- --	-- -- --	-- -- --	25.00 28.28 23.60	21.62 23.90 20.08	
Processing	\$\box	1988 1989 1990	2.76 3.53 2.68	3.51 4.04 3.58	2.77 3.31 2.78	2.16 2.83 1.69	-0.38 0.34 1.87	-0.38 0.34 1.87	-- -- --	-- -- --	-- -- --	1.40 0.42 0.75	1.88 0.78 1.65	
All	\$\box	1988 1989 1990	11.71 12.57 14.85	13.38 12.42 19.43	12.12 10.31 11.25	10.66 10.15 9.92	4.63 3.78 5.99	2.17 3.37 1.87	1.71 1.71 1.87	-- -- --	-- -- --	18.51 21.97 15.70	14.19 19.53 14.64	

-- = Not available.

1/ Equivalent on-tree returns.

Source: National Agricultural Statistics Service, USDA.

Table 6--U.S. producer price indexes for selected fruits and frozen juices, by months, 1988-90

Items	Years	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
		-1982=100-											
Fresh fruits:													
Grapefruit	1988	129.3	125.5	137.0	148.4	182.6	--	--	--	205.4	137.0	160.3	160.3
	1989	154.7	140.1	134.4	156.0	213.0	--	--	--	182.6	163.6	182.6	182.6
	1990	201.6	188.3	209.2	197.8	251.1	270.1	--	--	--	--	--	--
Lemons	1988	104.8	99.7	107.9	115.6	116.7	134.6	159.8	160.1	156.2	143.4	120.3	82.2
	1989	117.2	119.2	119.7	120.3	122.8	145.7	149.0	159.3	148.5	140.0	128.5	129.5
	1990	115.6	125.9	125.7	135.7	149.0	150.1	--	--	--	--	123.6	123.6
Oranges, Valencia	1988	119.4	118.0	116.5	116.6	116.6	--	--	--	157.4	112.4	101.2	101.2
	1989	106.8	111.5	111.2	109.6	123.6	140.5	--	--	--	--	--	--
	1990	157.4	151.7	163.0	153.1	140.5	--	--	--	--	--	--	--
Oranges, navel	1988	102.8	102.8	95.6	94.7	122.4	122.4	--	--	--	--	126.9	90.2
	1989	79.5	76.8	82.2	76.8	92.0	105.4	--	--	--	--	--	80.4
	1990	81.3	81.3	81.3	74.2	79.5	100.1	--	--	--	--	--	--
Apples, Delicious	1988	87.9	78.7	96.8	--	--	--	--	--	--	96.6	107.6	107.6
	1989	94.8	139.9	100.4	98.4	98.6	98.6	111.2	--	--	98.1	88.8	86.1
	1990	80.7	122.5	119.4	108.7	108.3	115.1	97.5	--	--	113.2	102.1	107.6
Apples, McIntosh	1988	107.6	94.7	76.7	89.1	117.9	117.9	89.1	--	--	103.3	--	--
	1989	95.6	96.5	89.1	89.1	122.5	116.9	120.0	--	--	103.3	--	--
	1990	113.2	122.5	--	--	--	--	--	--	--	113.2	--	--
Grapes	1988	--	--	--	--	--	--	--	--	113.6	117.5	131.3	--
	1989	--	--	--	--	--	--	--	--	99.7	97.9	--	--
	1990	--	--	--	--	--	--	--	--	145.0	--	--	--
Peaches	1988	--	--	--	--	--	--	--	--	107.2	77.5	218.7	--
	1989	--	--	--	--	--	--	--	--	81.6	126.9	149.5	--
	1990	--	--	--	--	--	--	--	--	184.3	172.2	--	--
Pears	1988	--	--	--	--	--	--	--	--	112.4	150.8	137.8	97.8
	1989	--	--	--	--	--	--	--	--	103.4	94.1	92.6	97.1
	1990	106.6	111.0	--	--	--	--	--	--	162.0	--	--	--
Strawberries	1988	100.5	100.5	100.5	55.8	55.8	91.6	73.7	107.2	73.7	150.7	64.7	31.3
	1989	100.5	78.1	81.5	39.7	55.8	73.7	67.0	67.0	80.4	78.2	131.3	97.8
	1990	100.5	113.8	100.5	100.5	62.5	100.5	100.5	100.5	90.5	--	118.2	97.1
Dried fruits:													
Prunes	1988	109.6	109.6	109.6	109.6	109.6	109.6	109.6	109.6	109.6	110.3	110.3	110.3
	1989	111.3	111.3	112.6	114.9	114.0	114.0	114.0	114.0	115.3	115.3	119.5	119.5
	1990	119.5	119.5	119.5	119.5	119.5	119.5	119.5	119.5	119.5	119.5	--	--
Raisins	1988	85.8	85.8	85.8	--	88.2	88.2	88.2	88.2	88.2	88.2	84.2	89.9
	1989	89.9	89.9	89.9	--	89.9	91.6	90.8	90.8	91.1	--	90.6	93.5
Frozen juices:													
Orange	1988	132.1	140.5	142.4	141.0	142.0	144.0	148.8	142.0	141.7	140.7	133.9	139.1
	1989	137.3	127.7	126.5	125.4	131.7	139.2	140.7	139.7	139.7	137.3	--	--
	1990	137.6	162.4	162.9	159.9	159.7	159.7	160.4	160.4	160.8	--	--	--
Grapefruit	1988	159.6	160.0	155.5	153.6	161.4	160.2	162.2	161.1	161.1	148.9	155.5	147.5
	1989	146.3	140.4	139.6	144.0	141.4	141.4	141.4	141.4	146.2	146.2	146.0	146.7
	1990	151.4	159.6	158.8	159.6	159.6	160.6	160.8	160.8	160.8	160.8	--	--
Lemonade	1988	121.2	121.2	121.2	--	116.3	116.3	101.4	118.8	116.8	116.8	121.7	126.5
	1989	126.5	126.5	126.5	124.3	--	116.8	116.8	116.8	116.8	116.8	130.8	131.4
	1990	136.2	139.6	139.6	139.6	139.6	133.7	137.1	137.1	137.1	137.1	--	--
Grape	1988	101.1	104.9	104.9	100.3	104.9	104.9	104.9	104.9	104.9	162.2	105.2	105.2
	1989	100.6	105.2	105.2	100.6	105.2	105.2	105.2	105.2	105.2	100.6	100.6	105.2
	1990	102.8	108.0	108.0	108.0	108.0	108.0	108.0	108.0	108.0	109.1	--	--

-- = Not available.

Source: Bureau of Labor Statistics, U.S. Department of Labor.

Table 7--Citrus fruit: Season-average equivalent returns per box received by growers, by variety and use, State and United States, 1988/89-1989/90

Variety and State	1988/89						1989/90										
	Equivalent P.H.D. 1/ Fresh Processed All			Equivalent on-tree Fresh Processed All			Equivalent P.H.D. 1/ Fresh Processed All			Equivalent on-tree Fresh Processed All							
	--Dollars per box-- 2/						--Dollars per box-- 2/										
Oranges:																	
Florida	9.50	8.48	8.54	7.65	6.63	6.69	11.40	6.58	6.92	9.55	4.73	5.07					
Early and midseason	9.40	10.30	10.26	7.55	8.45	8.41	15.60	8.57	8.75	13.75	6.72	6.90					
Valencia	9.46	9.25	9.26	7.61	7.40	7.41	12.16	7.36	7.62	10.31	5.51	5.77					
All																	
California	9.36	1.84	7.57	7.69	0.17	5.90	9.77	3.61	8.12	8.07	1.91	6.42					
Navel and miscellaneous	11.36	3.72	8.23	9.56	6.43	10.12	5.07	8.12	8.32	3.27	6.32						
Valencia	All	10.08	2.89	7.85	8.37	1.15	6.12	9.89	4.33	8.12	8.16	2.58					
Arizona	Navel and miscellaneous	13.04	0.97	11.94	11.34	-0.73	10.24	11.40	2.59	10.52	9.64	0.83					
Valencia	All	9.84	2.86	7.20	8.04	1.06	5.40	9.54	4.58	7.85	7.74	2.78					
Texas	All	11.16	2.67	8.73	9.40	0.87	6.97	10.10	4.41	8.50	8.32	2.61					
Early and midseason	8.46	5.52	8.02	7.39	4.09	6.90	9.10	4.33	7.34	7.92	3.23	6.19					
Valencia	All	7.99	5.11	7.53	6.92	3.02	5.49	9.3	3.53	7.53	7.92	2.43					
United States	All											5.71					
Early midseason, and Navel	9.43	7.96	8.32	7.74	6.12	6.52	10.02	6.17	7.36	8.31	4.34	5.56					
Valencia	All	10.82	9.42	9.69	9.03	7.58	7.86	10.45	7.87	8.50	8.65	6.04					
9.94	8.59	8.90	8.21	6.76	7.08	10.17	6.87	7.80	8.42	8.42	5.04	5.99					
Grapefruit:																	
Florida	7.63	4.83	6.13	6.03	3.18	4.50	11.60	4.91	7.51	10.00	3.25	5.87					
Seedless	All	5.28	5.28	5.28	3.68	3.68	14/	5.44	5.44	4/	3.84	3.84					
Seeded	7.63	4.88	6.08	6.03	3.24	4.45	11.60	4.95	7.43	10.00	3.28	5.79					
Texas	6.04	1.77	5.23	5.06	0.57	4.21	8.44	1.56	7.08	7.34	0.56	6.00					
California	9.57	0.16	6.42	7.79	-1.30	4.94	13.90	0.84	9.39	12.39	-0.67	7.88					
Arizona	6.74	0.13	4.66	5.14	-1.47	3.06	13.50	0.45	10.33	11.86	-1.19	6.69					
United States	7.64	4.47	6.02	6.12	2.85	4.45	11.98	4.45	7.81	10.43	2.81	6.21					
Lemons:																	
California	18.40	1.89	12.39	15.40	-1.11	9.39	21.24	3.19	15.15	18.14	0.09	12.05					
Arizona	15.42	1.87	8.93	12.52	-1.23	5.83	20.44	2.85	13.93	17.48	-0.11	10.97					
United States	17.92	1.89	11.73	14.90	-1.14	8.71	21.12	3.13	14.96	18.04	0.06	11.88					
Tangerines:																	
Florida	21.60	7.14	15.31	19.10	4.24	12.64	27.52	5.63	18.35	24.50	2.63	15.59					
California	18.66	2.14	14.08	16.86	0.34	12.28	21.52	3.13	18.30	19.72	1.33	16.50					
Arizona	18.84	1.14	15.35	17.04	-0.39	13.55	20.64	2.84	16.49	18.84	1.04	14.69					
United States	20.18	5.58	14.92	18.03	3.02	12.62	23.72	4.79	18.07	21.58	2.18	15.80					
Tangelos:																	
Florida	10.10	7.25	8.26	8.25	5.25	6.31	9.90	4.90	6.79	8.05	2.90	4.85					
Temples:																	
Florida	9.00	6.95	7.43	7.15	4.95	5.46	19.50	6.05	7.44	17.65	4.05	5.46					
Limes:																	
Florida	21.60	3.18	17.18	15.24	-1.22	11.29	21.20	2.30	13.87	14.83	-2.10	8.26					

1/ P.H.D.--Packinghouse-door. 2/ Net content of box varies. Approximated averages are as follows: Oranges-California and Arizona, 75 lbs.; Grapefruit-California, 85 lbs.; Texas, 90 lbs.; Desert Valleys and Arizona, 64 lbs.; Other California areas, 67 lbs.; Florida, 85 lbs.; Tangerines, 90 lbs.; Tangelos, 76 lbs.; Lemons, 80 lbs.; and Temples, 95 lbs.; Lemons, 76 lbs.; and Temples, 90 lbs. 3/ Fresh sales insignificant for 1989/90 due to freeze.

Source: National Agricultural Statistics Service, USDA.

Table 8--Noncitrus fruits: Marketing year average prices received by growers, United States, 1984-89 1/

Commodity	Units	Marketing year beginning					
		1984	1985	1986	1987	1988	1989
--Dollars--							
Apples, Fresh	Pounds	0.155	0.173	0.191	0.127	0.174	0.134
Peaches, Fresh	Pounds	0.161	0.206	0.199	0.185	0.213	0.233
Avocados	Short tons	557	953	344	1030	1140	1590
Pears, All	Short tons	229	269	267	198	274	275
Apricots	Short tons	308	264	403	347	363	340
Plums/Prunes	Short tons	208	230	260	139	183	209
Cranberries	Barrels	46.7	46.3	44.7	44.5	45.7	42.6
Bananas	Pounds	0.3	0.303	0.3	0.297	0.33	0.37
Grapes, all	Short tons	190	172	226	259	266	309
Raisin	short tons	156	141	213	223	205	248
Wine	Short tons	201	184	207	248	297	340
Table	Short tons	304	230	307	435	363	449
Dates	Short tons	791	860	828	872	896	990
Figs	Short tons	288	305	283	331	345	346
Kiwifruit	Short tons	1070	813	1030	710	760	400
Nectarines	Short tons	316	327	440	343	394	396
Olives	Short tons	550	559	587	608	517	510
Papayas	Pounds	0.114	0.142	0.182	0.165	0.179	0.191
Pineapples	Short tons	150	160	154	143	163	165
Plums	Short tons	212	514	657	308	475	445
Pomegranates	Short tons	106	318	395	340	359	273
Prunes (Dried)	Short tons	693	680	819	734	782	775
Strawberries	Hundredweight	49	52.6	57.6	58.5	54.1	54.1
Sweet Cherries	Short tons	609	799	823	748	788	712
Tart Cherries	Pounds	0.25	0.224	0.203	0.078	0.187	0.132

1/ Point of first sale.

Source: National Agricultural Statistics Service, USDA.

Table 9--U.S. retail prices for selected fruits and juice, by months, 1988-90

Items	Units	Years	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Apples, red delicious	\$/lb.	1988	0.571	0.636	0.643	0.643	0.689	0.797	1.006	0.957	0.768	0.704	0.706	.573
		1989	.729	.749	.741	.697	.697	.682	.740	.719	.649	.590	.590	.573
		1990	.601	.632	.652	.650	.653	.697	.750	.832	.877			
Bananas	\$/lb.	1988	0.374	0.415	0.413	0.423	0.422	0.501	0.433	0.397	0.389	0.421	0.423	0.407
		1989	.394	.415	.450	.523	.522	.479	.456	.434	.428	.432	.435	.416
		1990	.429	.492	.500	.481	.462	.447	.529	.463	.465			
Grapes, Thompson seedless	\$/lb.	1988	--	1.297	1.116	1.409	--	--	1.383	1.065	0.917	1.117	--	--
		1989	--	1.381	--	1.144	1.144	1.337	1.272	1.121	.958	1.166	1.494	--
		1990	--	1.380	1.144	1.108	1.455	1.369	1.238	.993	1.064			
Pears, Anjou	\$/lb.	1988	0.571	0.573	0.575	0.627	0.682	0.729	--	--	--	--	--	0.642
		1989	.677	.668	.710	.743	.774	.797	--	--	--	--	--	.759
		1990	.675	.736	.757	.787	.783	.814	--	--	--			
Strawberries 1/	\$/12 oz. pint	1988	--	--	1.181	.693	.919	0.937	1.059	0.971	1.216	--	--	--
		1989	--	--	1.218	.966	.831	1.055	1.117	.986	1.087	--	--	--
		1990	--	1.638	1.338	1.109	.781	.987	.965	1.081	1.210			
Oranges, Valencias	\$/lb.	1988	--	--	--	--	--	0.558	0.574	0.565	0.598	0.630	--	--
		1989	--	--	--	--	--	--	.613	.603	.588	.590	--	--
		1990	--	--	--	--	--	.575	.571	.561				
Oranges, naval	\$/lb.	1988	0.501	0.496	0.504	0.599	--	--	--	--	--	--	0.585	0.528
		1989	.521	.464	.471	.511	.534	--	--	--	--	--	--	0.562
		1990	.501	.580	.570	.560	.578	.621	--	--	--	--		.528
Grapefruit	\$/lb.	1988	0.447	0.448	0.440	0.441	0.438	0.469	0.570	0.640	0.691	0.664	0.520	0.446
		1989	.443	.423	.411	.417	.467	.520	.587	.664	.728	.638	.532	.473
		1990	.532	.579	.626	.690	.737	.778	.828	.755	.664			
Lemons	\$/lb.	1988	0.873	0.776	0.828	0.850	0.887	0.903	1.076	1.084	1.086	0.981	0.956	0.907
		1989	.888	.873	.953	.959	.961	1.040	1.043	1.041	1.102	1.100	1.021	.960
		1990	0.925	0.933	1.015	1.127	1.101	1.103	1.179	1.155	1.158			
Orange juice, concentrate 2/	\$/12 oz. cans	1988	1.638	1.735	1.736	1.866	1.879	1.902	1.861	1.835	1.854	1.881	1.820	
		1989	1.868	1.834	1.834	1.857	1.854	1.857	1.900	1.920	1.893	1.835	1.797	
		1990	1.817	1.980	2.150	2.214	2.241	2.289	2.276	2.227	2.262			

-- = Not available.

1/ Dry pint.

2/ Per 16 ounce.

Source: Bureau of Labor Statistics, U.S. Department of Labor.

Table 10--Fresh fruit: Retail price, marketing spreads, and grower-packer return per pound, sold in the Northeast region, season average, 1987/88-1989/90 1/

Commodity, area and season	Retail price	Marketing spreads		Grower-packer return 2/ (f.o.b. shipping point price)	
		Absolute	Percent of retail price	Absolute	Percent of retail price
		--Cents--	Percent	Cents	Percent
Apples, red delicious, Washington:					
Oct.-June					
1987/88	68.0	43.5	64	24.5	36
1988/89	81.8	51.8	63	30.0	37
1989/90	74.1	50.6	68	23.5	32
Grapefruit, Florida:					
Nov.-Apr.					
1987/88	46.5	33.3	72	13.2	28
1988/89	42.8	30.1	70	12.7	30
1989/90	50.8	33.4	66	17.4	34
Lemons, California:					
Aug.-July					
1987/88	89.6	56.9	64	32.7	36
1988/89	97.6	62.8	64	34.8	36
1989/90	104.9	67.6	64	37.3	36
Oranges, navel: California					
Dec.-May					
1987/88	59.6	39.7	67	19.9	33
1988/89	49.4	30.3	61	19.1	39
1989/90	59.7	40.0	67	19.7	33
Oranges, Valencia: California					
May-Nov.					
1987	63.6	42.3	67	21.3	33
1988	63.3	43.8	69	19.5	31
1989	61.7	40.6	66	21.1	34

1/Season average prices are weighted averages (monthly average prices weighted by monthly arrivals in New York City). 2/ Adjusted to account for waste and spoilage incurred during marketing.

Sources: Bureau of Labor Statistics, Department of Labor, and Economic Research Service, USDA.

Table 11--Fresh fruit: Retail price, marketing spreads, and grower-packer return per pound,
sold in the North Central region, season average, 1987/88-1989/90 1/

Commodity, area, and season	Retail price	Marketing spreads		Grower-packer return 2/ (f.o.b. shipping point price)	
		Absolute	Percent of retail price	Absolute	Percent of retail price
	--Cents--	Percent		Cents	Percent
Apples, red delicious, Washington: Oct.-June					
1987/88	68.6	44.0	64	24.6	36
1988/89	76.0	46.1	61	29.9	39
1989/90	67.6	43.8	65	23.8	35
Grapefruit, Florida: Nov.-Apr.					
1987/88	48.9	35.4	72	13.5	28
1988/89	48.7	35.7	73	13.0	27
1989/90	56.9	40.3	71	16.6	29
Lemons, California: Aug.-July					
1987/88	104.0	71.3	69	32.7	31
1988/89	102.4	68.8	67	33.6	33
1989/90	111.0	73.8	66	37.2	34
Oranges, navel: California Dec.-May					
1987/88	56.1	35.7	64	20.4	36
1988/89	56.0	36.7	66	19.3	34
1989/90	56.7	36.9	65	19.8	35
Oranges, Valencia: California May-Nov.					
1987	60.6	39.3	65	21.3	35
1988	61.6	42.0	68	19.6	32
1989	61.0	39.9	65	21.1	

1/ Season average prices are weighted averages (monthly average prices weighted by monthly arrivals in Chicago). 2/ Adjusted to account for waste and spoilage incurred during

Sources: Bureau of Labor Statistics, Department of Labor, and Economic Research Service, USDA.

Table 12--All Florida citrus: Acreage and tree numbers in commercial groves, by variety, 1984 to 1990

County and variety	Acreage in commerical groves				Trees in commercial groves			
	1984	1986	1988	1990	1984	1986	1988	1990
Acres								1,000 trees
Oranges:								
Hamlin	129,928	115,789	151,665	171,518	11,549.3	11,135.6	15,797.4	19,271.2
Navel	12,584	13,236	18,295	19,067	1,149.0	1,296.1	1,918.2	2,117.3
Other early	26,284	15,198	16,881	16,532	2,073.1	1,316.7	1,625.4	1,726.6
Pineapple	86,616	67,837	65,670	62,997	7,708.2	6,347.5	6,429.1	6,538.6
Other mids	11,226	6,304	5,590	4,582	792.0	449.9	404.3	350.4
Valencia	254,610	207,163	224,868	246,483	21,520.1	18,720.8	22,240.0	26,974.7
Unidentified	52,743	40,725	53,768	43,630	5,093.0	4,194.8	6,122.2	5,634.6
Sub-total	573,991	466,252	536,737	564,809	49,884.7	43,461.4	54,536.6	62,613.4
Grapefruit:								
Seedy	15,327	10,326	8,903	7,300	1,015.8	696.8	625.9	547.7
White seedless	62,013	54,761	53,084	52,314	4,800.6	4,324.2	4,267.0	4,338.4
Colored seedless	48,806	47,004	51,443	57,762	4,002.5	4,015.9	4,567.1	5,430.9
Unidentified	8,534	5,754	6,176	7,924	764.0	587.1	621.2	876.2
Sub-total	134,680	117,845	119,606	125,300	10,582.9	9,624.0	10,081.2	11,193.2
Specialty:								
Temple	13,826	10,251	9,942	8,861	1,215.1	933.2	927.9	868.3
Orlando tangelos	9,216	6,905	7,734	7,514	843.5	638.4	745.4	772.8
Minneola tangelos	2,195	2,058	2,265	2,470	198.0	188.9	218.5	257.1
Other tangelos	1,265	899	967	1,127	145.4	104.7	115.2	143.6
Sunburst tangerines				3,565				484.0
Robinson tangerines	3,160	2,278	1,938	1,956	368.0	268.8	232.4	253.2
Dancy tangerines	4,957	2,919	2,345	2,142	386.3	238.9	195.7	196.7
Honey tangerines	6,215	4,845	5,093	5,712	663.0	540.2	596.0	693.7
Limes	7,009	7,238	7,079	1/ 6,864	1,118.2	1,141.9	1,110.4	1/ 1,069.6
True lemons	1,808	1,547	946	844	235.7	214.5	153.0	138.5
Meyer lemons	488	167	150	78	77.5	24.2	23.5	14.3
Other citrus	2,555	1,288	3,127	1,525	257.2	149.7	372.4	182.9
Sub-total	52,694	40,395	41,586	42,658	5,507.9	4,443.4	4,690.4	5,074.7
Total citrus	761,365	624,492	697,929	732,767	65,975.5	57,528.8	69,308.2	78,881.3

1/ Dade county lime acreage surveyed November 1988.

Source: Florida Agricultural Statistics Service.

Table 13--Citrus fruits: Production, use, and value, United States, 1982/83-1989/90

Fruit and season	Production	Use of production				Value of production 1/		
		Fresh		Processed				
		Quantity	Percentage	Quantity	Percentage			
		1,000 short tons				1,000 dollars		
--1,000 short tons--		1,000 short tons				1,000 dollars		
Oranges:								
1982/83	9,519	2,323	24.4	7,196	75.6	1,317,056		
1983/84	7,243	1,867	25.8	5,376	74.2	1,503,885		
1984/85	6,719	1,876	27.9	4,843	72.1	1,455,410		
1985/86	7,476	2,112	28.3	5,364	71.7	1,090,428		
1986/87	7,697	2,070	26.9	5,627	73.1	1,322,499		
1987/88	8,551	2,085	24.4	6,466	75.6	1,773,681		
1988/89	8,949	2,016	22.5	6,933	77.5	1,848,574		
1989/90	7,809	2,203	28.2	5,606	71.8	1,454,930		
Grapefruit:								
1982/83	2,465	1,297	52.6	1,168	47.4	186,197		
1983/84	2,184	1,028	47.1	1,156	52.9	220,196		
1984/85	2,266	911	40.2	1,355	59.8	310,530		
1985/86	2,352	1,088	46.3	1,264	53.7	341,957		
1986/87	2,586	1,200	46.4	1,386	53.6	414,395		
1987/88	2,801	1,332	47.6	1,469	52.4	478,588		
1988/89	2,844	1,395	49.1	1,449	50.9	418,133		
1989/90	1,953	871	44.6	1,082	55.4	383,878		
Lemons:								
1982/83	950	436	45.9	514	54.1	109,298		
1983/84	788	428	54.3	360	45.7	117,408		
1984/85	967	441	45.6	526	54.4	168,276		
1985/86	692	433	62.6	259	37.4	217,065		
1986/87	1,087	469	43.1	618	56.9	182,171		
1987/88	785	459	58.5	326	41.5	202,046		
1988/89	759	466	61.4	293	38.6	234,606		
1989/90	706	464	65.7	242	34.3	278,205		
Limes:								
1982/83	75	43	57.3	32	42.7	22,255		
1983/84	63	36	57.1	27	42.9	17,506		
1984/85	72	45	62.5	27	37.5	19,901		
1985/86	76	39	51.3	37	48.7	21,901		
1986/87	63	37	58.7	26	41.3	19,569		
1987/88	57	38	66.7	19	33.3	23,314		
1988/89	55	42	76.4	13	23.6	21,474		
1989/90	72	44	61.1	28	38.9	22,884		
Tangelos:								
1982/83	171	85	49.7	86	50.3	24,102		
1983/84	162	72	44.4	90	55.6	22,796		
1984/85	162	66	40.7	96	59.3	34,354		
1985/86	133	60	45.1	73	54.9	19,141		
1986/87	180	59	32.8	121	67.2	24,626		
1987/88	189	63	33.3	126	66.7	32,605		
1988/89	171	61	35.7	110	64.3	31,392		
1989/90	132	50	37.9	82	62.1	20,045		
Tangerines: 2/								
1982/83	291	179	61.5	112	38.5	56,457		
1983/84	262	163	62.2	99	37.8	52,020		
1984/85	193	122	63.2	71	36.8	65,554		
1985/86	196	131	66.8	65	33.2	61,952		
1986/87	228	157	68.9	71	31.1	69,720		
1987/88	218	153	70.2	65	29.8	80,400		
1988/89	239	153	64.0	86	36.0	83,119		
1989/90	164	115	70.1	49	29.9	70,366		
Templets:								
1982/83	211	70	33.2	141	66.8	28,056		
1983/84	130	34	26.2	96	73.8	21,489		
1984/85	146	28	19.2	118	80.8	26,225		
1985/86	133	41	30.8	92	69.2	16,052		
1986/87	153	47	30.7	106	69.3	20,513		
1987/88	160	58	36.3	102	63.8	27,940		
1988/89	169	39	23.1	130	76.9	27,844		
1989/90	63	7	11.1	56	88.9	10,421		
Total: 3/								
1982/83	13,682	4,433	32.4	9,249	67.6	1,743,421		
1983/84	10,832	3,628	33.5	7,204	66.5	1,755,300		
1984/85	10,525	3,489	33.1	7,036	66.9	2,080,250		
1985/86	11,058	3,904	35.3	7,154	64.7	1,768,496		
1986/87	11,994	4,039	33.7	7,955	66.3	2,053,493		
1987/88	12,761	4,188	32.8	8,573	67.2	2,618,574		
1988/89	13,186	4,172	31.6	9,014	68.4	2,665,142		
1989/90	10,899	3,754	34.4	7,145	65.6	2,240,729		

1/ Value of production at the point of first sale.

2/ Per program modification, all tangerines include Honey tangerines beginning with the 1987/88 season, and beginning with the 1989/90 season includes Sunburst tangerines.

3/ Does not include Florida lemons, k-early citrus fruit, and California limes.

Source: National Agricultural Statistics Service, USDA.

Table 14--Selected citrus fruit: Used for processing by percentages of total production, 1982/83-1989/90

State and variety	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90
--Percent--								
Oranges:								
Florida--								
Temples	66.7	73.7	80.7	69.1	69.0	63.6	76.8	89.6
Early and midseason	91.4	92.9	92.0	92.0	92.0	92.5	93.6	92.9
Valencia	93.9	94.3	95.4	93.0	93.3	93.9	95.0	97.5
Total	92.6	93.5	93.6	92.5	92.6	93.1	94.2	94.6
California--								
Navel and miscellaneous	32.3	24.8	11.8	19.7	23.2	21.0	23.8	26.8
Valencia	55.3	17.6	34.0	18.2	35.0	40.4	41.0	39.7
Total	43.2	22.6	22.9	19.1	28.0	30.0	31.1	31.9
Texas--								
Navel and miscellaneous	41.5	28.1	0.0	5.0	8.0	10.9	14.9	36.9
Valencia	40.7	100.0	0.0	9.1	13.3	10.6	17.7	100.0
Total	41.2	44.6	0.0	6.5	10.3	10.8	15.9	45.0
Arizona--								
Navel and miscellaneous	12.9	12.5	6.0	11.8	14.0	6.6	9.1	10.0
Valencia	40.7	17.6	26.8	21.6	35.3	29.3	37.8	34.0
Total	33.0	16.2	21.7	19.0	27.4	21.7	28.5	28.2
Grapefruit:								
Florida--								
Seedless	47.1	54.2	63.7	55.0	55.4	54.8	53.5	61.1
Colored	27.6	32.7	37.0	28.4	30.7	31.1	33.0	43.0
White	58.5	66.8	78.4	73.7	73.7	72.5	71.0	77.5
Other seeded	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total	53.5	59.3	65.9	58.0	58.0	57.1	56.3	62.6
California--								
Desert Valley	41.0	39.5	31.6	33.3	39.5	38.1	27.1	32.4
Other areas	37.5	33.3	28.0	26.7	35.0	30.6	34.4	36.0
Total	39.5	36.2	29.5	29.6	37.1	34.1	31.3	34.5
Arizona	40.0	32.0	34.9	35.7	36.7	33.3	31.5	24.3
Texas	30.4	10.6	0.0	9.1	19.2	26.7	19.0	19.8
Tangerines:								
Florida ^{1/}	36.2	37.5	48.6	39.0	37.5	34.1	43.5	40.8
California	47.0	50.3	31.8	29.4	26.8	27.1	27.7	17.5
Arizona	31.8	21.9	18.2	24.2	19.4	16.7	20.0	23.3
Total	38.7	37.9	35.3	32.4	30.2	29.2	35.0	28.5
Lemons:								
California	54.4	46.4	52.8	37.1	53.5	40.6	36.4	33.8
Arizona	52.9	42.0	60.2	39.0	67.0	46.2	47.9	37.0
Total	54.1	45.7	54.4	37.4	56.8	41.6	38.6	34.3

1/ Per program modification, all tangerines include honey tangerines beginning with the 1987/88 season, Estimates starting with the 1982/83 season have been revised to include the honey variety. Beginning with the 1989/90 season includes Sunburst tangerines.

Source: National Agricultural Statistics Service, USDA.

Table 15--Estimated utilization of round oranges and Temples, Florida, 1984/85-1990/91 1/

Item	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
--Million boxes--							
Fresh	6.8	9.5	9.7	10.1	8.4	5.3	11.5
Frozen concentrate	84.1	94.0	92.6	106.5	109.9	71.0	114.9
Chilled juice	14.9	17.0	19.5	23.3	29.9	33.8	39.3
Canned juice	1.1	1.3	0.9	0.8	1.1	0.6	1.2
Blends	0.1	0.1	0.1	0.1	2/	2/	2/
Noncertified	0.2	0.3	0.3	0.8	1.0	0.8	1.2
Total	107.2	122.2	123.1	141.6	150.3	111.5	168.1

1/ The total used in processed products does not agree exactly with the utilization reported by the Florida Citrus Processors Association because their orange utilization report includes some specialty fruit.

2/ Less than 50,000 boxes.

Source: Florida Department of Citrus.

Table 16--U.S. orange juice supply, 1988/89-1990/91

Item	1988/89	Forecast	
		1989/90	1990/91
--Million sse gallons 1/--			
Florida production	888.5	542.9	956.8
Other U.S. production 2/	80.0	103.5	82.6
U.S. production	968.5	646.4	1,039.4
U.S. imports	362.0	561.7	399.2
U.S. exports 3/	73.6	78.0	80.0
Net imports	288.4	483.7	319.2
Domestic availability	1,256.9	1,130.1	1,358.6

1/ SSE = single-strength equivalent.

2/ Estimated processed utilization for Texas, California and Arizona, multiplied by estimated yield.

3/ Excludes Canada.

Source: Florida Department of Citrus.

Table 17--Oranges used for frozen concentrate, Florida, 1985/86-1990/91

Season	Orange and Temple production --Million boxes--	Used for frozen concentrates 1/	Yield per box 2/	
			Percent	Gallons
1985/86	122.2	96.1	78.6	1.38
1986/87	123.1	96.2	78.1	1.51
1987/88	141.6	110.2	77.8	1.55
1988/89	150.4	113.7	75.6	1.54
1989/90	111.6	73.6	65.9	1.23
1990/91	168.1	--	--	1.52

-- = Not available.

1/ Includes tangelos, temples, tangerines, and K-early citrus.

2/ Gallons per box at 42.0 degrees Brix equivalent.

Source: National Agricultural Statistics Service, USDA.

Table 18--Orange and grapefruit processed, Florida, 1982/83-1989/90

Crop and season	Frozen concentrates	Chilled products	Other processed 1/	Total processed
				--1,000 boxes--
Oranges: 2/				
1982/83	114,627	18,254	2,665	135,546
1983/84	94,547	16,981	2,909	114,437
1984/85	86,112	14,903	1,907	102,922
1985/86	96,061	17,267	1,361	114,689
1986/87	96,182	19,661	948	116,791
1987/88	110,206	23,325	904	134,435
1988/89	113,729	29,902	1,114	144,745
1989/90	73,640	33,836	659	108,135
Grapefruit:				
1982/83	13,977	1,731	5,379	21,087
1983/84	18,728	1,320	4,191	24,239
1984/85	22,996	1,065	4,951	29,012
1985/86	21,572	1,189	4,369	27,130
1986/87	24,143	2,295	2,424	28,862
1987/88	26,690	1,965	2,085	30,740
1988/89	26,615	2,626	1,607	30,848
1989/90	19,405	1,931	1,019	22,355

1/ Includes cannery juice, blends, sections and salads.

2/ Includes tangelos, temples, tangerines and k-early citrus.

Source: National Agricultural Statistics Service, USDA.

Table 19--Frozen concentrated citrus juices: Canners' stocks, packs, supplies, and movement, Florida, 1986/87-1989/90

Item and season	Carryin	Pack	Supply			Movement			Stocks 1/
			Other supplies		To date 1/	Total season	To date 1/	Total season	
			To date 1/	Total season	-1,000 gallons 2/-	To date 1/	Total season	To date 1/	
Oranges:									
1986/87	36,995	145,056	70,198	82,972	252,249	265,023	193,284	225,233	58,965
1987/88	39,790	169,973	57,772	70,815	267,535	280,578	207,940	238,444	59,595
1988/89	42,084	174,717	50,329	64,388	267,130	281,189	206,184	234,950	60,946
1989/90	46,306	90,285	82,550		219,141		166,149		52,992
Grapefruit:									
1986/87	3,422	28,875	28,875	1,369	33,503	33,666	25,043	28,450	8,460
1987/88	5,216	31,906	31,906	1,342	38,464	38,679	24,684	28,881	13,780
1988/89	9,798	32,466	32,466	1,694	42,858	42,920	24,699	27,602	18,159
1989/90	15,152	21,774		735	37,661		22,003		15,658
Tangerines:									
1986/87	279	373	463	98	1,115	750	993	660	122
1987/88	90	583	659	659	1,332	1,332	882	1,007	450
1988/89	325	495	92	97	912	912	802	836	110
1989/90	81	371	233		685	685	463		222

1/ For 1989/90 season, week ending October 13; 1988/89, October 8; and 1987/88, October 14. These respective dates include data through the 45th week of each season.

2/ Oranges -42.0 degree Brix, grapefruit -40 degree Brix, and tangerines -42 degree Brix.

Source: Florida Citrus Processors Association.

Table 20--Canned citrus juices: Canners' packs, supplies, and movement,
Florida, 1986/87-1989/90

Item and season 1/	Carryin	Pack	Total supply	Movement	Carryout
--1,000 cases, 24 No. 2's 2--					
Oranges: 3/					
1986/87	986	8,122	9,108	8,084	1,024
1987/88	1,024	7,256	8,280	7,425	855
1988/89	855	8,164	9,019	8,227	792
1989/90	792	6,640	7,432	6,817	615
Grapefruit: 3/					
1986/87	1,515	8,982	10,497	9,027	1,471
1987/88	1,471	7,724	9,195	7,871	1,323
1988/89	1,323	7,956	9,279	7,885	1,394
1989/90	1,394	5,986	7,380	6,581	799
Blend:					
1986/87	126	533	659	533	126
1987/88	126	449	575	458	117
1988/89	117	424	541	426	116
1989/90	116	334	450	374	76

1/ Season beginning approximately October 1.

2/ Single-strength.

3/ Includes reconstituted juice.

Source: Florida Citrus Processors Association.

Table 21--Estimated utilization of grapefruit, Florida, 1984/85-1990/91

Item	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
--Million boxes--							
Fresh	14.8	19.4	20.6	22.6	23.2	12.9	24.3
Canned	3.6	3.0	2.4	2.0	1.6	1.0	1.3
Frozen concentrate	23.0	21.6	24.1	26.7	26.6	19.4	21.2
Chilled juice	1.1	1.2	1.3	1.1	1.7	1.2	2.2
Blends	1.5	1.3	1.1	1.0	0.9	0.7	0.8
Noncertified		0.3	0.3	0.5	0.8	0.5	0.7
Total	44.0	46.8	49.8	53.9	54.8	35.7	50.5

Source: Florida Department of Citrus.

Table 22--Apples, commercial crop 1/: Total production and season-average price received by growers, 1988-89, and indicated 1990

Area and State	Total production			Price per pound					
	1988	1989	Indicated	1988	1989				
			1990						
--Million pounds--									
Eastern States:									
Maine	94.0	69.0	85.0	19.7	21.1				
New Hampshire	57.0	41.0	47.0	22.6	23.1				
Vermont	45.0	45.0	45.0	18.4	19.2				
Massachusetts	88.0	78.0	85.0	22.6	21.8				
Rhode Island	6.0	5.5	5.5	24.6	24.4				
Connecticut	41.0	36.0	42.0	24.4	24.6				
New York	910.0	960.0	990.0	10.8	10.4				
New Jersey	65.0	48.0	55.0	12.0	15.3				
Pennsylvania	520.0	320.0	470.0	9.2	10.7				
Delaware	19.0	15.0	19.5	12.2	11.3				
Maryland	54.0	37.0	38.0	12.2	11.2				
Virginia	425.0	325.0	210.0	11.1	10.2				
West Virginia	215.0	115.0	145.0	13.0	8.7				
North Carolina	350.0	220.0	230.0	8.0	8.8				
South Carolina	38.0	35.0	30.0	12.1	12.0				
Georgia	33.0	25.0	25.0	13.1	14.0				
Total	2,960.0	2,374.5	2,522.0						
Central States:									
Ohio	95.0	125.0	120.0	17.7	17.9				
Indiana	56.0	64.0	57.0	17.6	18.7				
Illinois	85.0	91.0	65.0	16.3	13.0				
Michigan	830.0	950.0	750.0	8.8	8.2				
Wisconsin	45.0	65.0	45.0	21.2	15.6				
Minnesota	14.0	31.0	22.0	30.2	27.8				
Iowa	9.5	11.5	11.5	21.4	20.8				
Missouri	56.0	55.0	41.0	17.2	13.6				
Kansas	12.0	13.0	8.0	17.6	20.9				
Kentucky	11.0	16.0	8.0	15.8	18.0				
Tennessee	12.5	11.5	9.0	15.6	14.7				
Arkansas	10.0	9.0	11.0	16.8	18.8				
Total	1,236.0	1,442.0	1,147.5						
Western States:									
Idaho	135.0	158.0	165.0	14.0	7.9				
Colorado	65.0	70.0	35.0	11.0	9.6				
New Mexico	10.0	5.3	11.5	19.5	20.0				
Utah	40.0	56.0	26.0	12.5	12.0				
Washington	3,900.0	5,000.0	4,700.0	13.0	8.7				
Oregon	155.0	160.0	175.0	11.9	5.0				
California	630.0	675.0	650.0	18.7	15.0				
Arizona 2/		24.8	40.0		9.3				
Total	4,935.0	6,149.1	5,802.5						
United States	9,131.0	9,965.6	9,472.0	12.7	10.2				

1/ In orchards of 100 or more bearing-age trees.

2/ Estimates began with 1989 crop.

Source: National Agricultural Statistics Service, USDA.

Table 23--Grapes: Total production and season-average price received by growers in principal States, 1988-89, and indicated 1990 production

States	Total production 1/			Price per ton	
	1988	1989	Indicated 1990	1988	1989
	--1,000 short tons--			--Dollars--	
New York	157.0	152.0	145.0	230	254
Pennsylvania	63.0	60.0	47.0	214	274
Ohio	8.9	8.0	9.0	264	266
Michigan	53.0	43.0	53.0	256	265
Missouri	3.3	3.6	1.8	311	348
North Carolina	3.3	1.7	3.0	330	406
Georgia	2.5	2.8	3.0	911	781
South Carolina	0.5	0.3	0.4	394	810
Arkansas	7.0	6.5	6.3	300	319
Arizona	25.5	26.5	29.0	1,250	674
Washington	182.0	229.0	193.0	245	302
Oregon	7.8	7.5	10.0	610	740
Total 1/	513.8	540.9	500.5		
California:					
Wine	2,180.0	2,190.0	2,100.0	297	340
Table	770.0	630.0	610.0	363	449
Raisin 2/	2,570.0	2,570.0	2,250.0	205	248
All	5,520.0	5,390.0	4,960.0	263	309
United States	6,033.8	5,930.9	5,460.5	266	309

1/ Some figures may not add due to rounding.

2/ Fresh basis.

Source: National Agricultural Statistics Service, USDA.

Table 24--Tree nuts: Production in principal States, 1988-89, and indicated 1990

Crop and State	1988	1989	Indicated 1990	Crop and State	1988	1989	Indicated 1990
Almonds: California	590,000	490,000	655,000	Pecans: North Carolina	5,500	700	1,500
				South Carolina	6,500	1,000	1,200
Macadamia nuts: Hawaii	45,500	50,500	--	Georgia	110,000	85,000	90,000
Pistachios: California	94,000	39,000	115,000	Florida	6,000	7,000	3,600
Hazelnuts: Oregon	16,300	12,800	21,500	Alabama	10,000	22,000	8,000
Washington	200	200	300	Mississippi	10,000	8,500	4,000
2 States	16,500	13,000	21,800	Arkansas	3,000	1,000	400
Walnuts, English: California	209,000	229,000	225,000	Louisiana	22,000	14,000	5,000
				Oklahoma	47,000	9,000	6,500
				Texas	60,000	55,000	65,000
				New Mexico	26,000	29,000	31,000
				California	2,200	2,000	3,000
				Other 1/		16,300	17,900
				Total	308,200	250,500	237,100
				Improved varieties 2/	185,500	161,000	166,650
				Native and seedling	122,700	73,200	52,550

-- = Not available.

1/ Arizona, Kansas, Missouri, and Tennessee, beginning with the 1989 crop. No breakdown between varieties available.

2/ Budded, grafted, or topworked varieties.

Source: National Agricultural Statistics Service, USDA.

Table 25--Almonds: Production, supply, and distribution, by country, 1988/89-1990/91

Country	Marketing year 1/	Beginning stocks	Production	Imports	Total supply	Exports	Domestic consumption	Ending stocks	Total distribution
-- Metric tons (shell basis) --									
Greece	1988/89	2,133	19,000	1,550	22,683	5,800	14,100	2,783	22,683
	1989/90	2,783	17,160	1,600	21,543	4,500	14,200	2,843	21,543
	1990/91	2,843	14,000	3,000	19,843	2,800	14,300	2,743	19,843
Italy	1988/89	6,000	14,000	10,550	30,550	5,142	19,408	6,000	30,550
	1989/90	6,000	18,000	8,600	32,600	4,400	22,200	6,000	32,600
	1990/91	6,000	22,000	10,000	38,000	6,000	24,000	8,000	38,000
Morocco	1988/89	600	7,400	17	8,017	1,133	6,284	600	8,017
	1989/90	600	11,100	24	11,724	1,200	9,624	930	11,724
	1990/91	900	9,000	20	9,920	1,200	8,020	700	9,920
Portugal	1988/89	995	900	690	2,585	417	2,000	168	2,585
	1989/90	168	3,500	190	3,858	1,100	2,050	708	3,858
	1990/91	708	3,000	185	3,893	1,250	2,150	493	3,893
Spain	1988/89	38,045	40,000	4,900	82,945	14,500	30,000	38,445	82,945
	1989/90	38,445	90,000	1,200	129,645	36,000	30,000	63,645	129,645
	1990/91	63,645	60,000	1,500	125,145	35,000	30,000	60,145	125,145
Turkey	1988/89	2,000	14,000	0	16,000	1,000	13,000	2,000	16,000
	1989/90	2,000	15,000	0	17,000	1,000	13,000	3,000	17,000
	1990/91	3,000	13,000	0	16,000	1,000	13,000	2,000	16,000
United States 2/	1988/89	103,351	267,620	313	371,284	165,097	84,989	121,198	371,284
	1989/90	120,297	222,260	117	342,672	155,302	95,426	91,946	342,674
	1990/91	97,523	297,100	99	394,722	170,099	98,069	126,554	394,722
Totals	1988/89	153,124	362,920	18,020	534,064	193,089	169,781	171,194	534,064
	1989/90	170,293	377,020	11,731	559,044	203,502	186,500	169,042	559,044
	1990/91	174,619	418,100	14,804	607,523	217,349	189,539	200,635	607,523

1/ Marketing years are as follows: July-June in United States, Morocco, and Tunisia; September-August in Spain, Italy, and Turkey; October-September in Greece; and January-December in Portugal.

2/ U.S. export, stock, and consumption data are from the Almond Board of California.

Note: U.S. Census Bureau export figures do not match these table data due to variations in actual dates of shipments.

Source: Horticultural Products Review, FAS, USDA.

Table 26--Hazelnuts: Production, supply, and distribution, by country, 1988/89-1990/91

Country	Marketing year 1/	Beginning stocks	Production	Imports	Total supply	Exports	Domestic consumption	Ending stocks	Total distribution
-- Metric tons (in-shell basis) --									
Italy	1988/89	16,000	140,000	16,642	172,642	85,045	57,597	30,000	172,642
	1989/90	30,000	140,000	11,500	181,500	115,000	60,000	6,500	181,500
	1990/91	6,500	100,000	20,000	126,500	60,500	61,000	5,000	126,500
Spain	1988/89	11,830	17,500	460	29,790	13,000	12,000	4,790	29,790
	1989/90	4,790	30,000	1,700	36,490	18,000	11,000	7,490	36,490
	1990/91	7,490	25,000	1,300	33,790	15,000	12,000	6,790	33,790
Turkey	1988/89	40,000	410,000	0	450,000	231,000	129,000	90,000	450,000
	1989/90	90,000	520,000	0	610,000	220,000	180,000	210,000	610,000
	1990/91	210,000	380,000	0	590,000	260,000	180,000	150,000	590,000
United States	1988/89	2,974	14,970	10,364	28,308	4,306	22,536	1,466	28,308
	1989/90	1,466	11,800	6,582	19,848	5,147	13,423	1,278	19,848
	1990/91	1,278	19,100	4,500	24,878	4,000	19,478	1,400	24,878
Totals	1988/89	70,804	582,470	27,466	680,740	333,351	221,133	126,256	680,740
	1989/90	126,256	701,800	19,782	847,838	358,147	264,423	225,268	847,838
	1990/91	225,268	524,100	25,800	775,168	339,500	272,478	163,190	775,168

1/ Marketing years are as follows: August-July in United States; September-August in Spain, Italy, and Turkey.

Note: U.S. Census Bureau export figures do not match these table data due to variations in actual dates of shipments.

Source: Horticultural Products Review, FAS, USDA.

Table 27--Pistachios: Production, supply, and distribution, by country, 1988/89-1990/91

Country	Marketing year 1/	Beginning stocks	Production	Imports	Total supply	Exports	Domestic consumption	Ending stocks	Total distribution
--Metric tons (in-shell basis)--									
Greece	1988/89	1,125	3,000	10	4,135	15	3,250	870	4,135
	1989/90	870	4,940	10	5,820	500	3,500	1,820	5,820
	1990/91	1,820	3,000	0	4,820	100	3,500	1,220	4,820
Italy	1988/89	3,100	300	5,999	9,399	1,375	6,624	1,400	9,399
	1989/90	1,400	3,300	6,600	11,300	2,500	7,300	1,500	11,300
	1990/91	1,500	300	7,700	9,500	1,500	7,700	300	9,500
Syria	1988/89	260	17,900	500	18,660	200	18,000	460	18,660
	1989/90	460	18,000	300	18,760	300	18,000	460	18,760
	1990/91	460	20,000	100	20,560	500	19,000	1,060	20,560
Turkey	1988/89	16,000	15,000	0	31,000	4,000	17,000	10,000	31,000
	1989/90	10,000	25,000	0	35,000	5,000	18,000	12,000	35,000
	1990/91	12,000	5,000	0	17,000	1,000	15,000	1,000	17,000
United States	1988/89	5,377	42,640	971	48,988	8,625	26,346	14,017	48,988
	1989/90	14,017	17,690	3,311	35,018	6,191	18,864	9,963	35,018
	1990/91	9,963	52,160	1,000	63,123	12,896	30,000	20,227	63,123
Totals	1988/89	25,862	78,840	7,480	112,182	14,215	71,220	26,747	112,182
	1989/90	26,747	68,930	10,221	105,898	14,491	65,664	25,743	105,898
	1990/91	25,743	80,460	8,800	115,003	15,996	75,200	23,807	115,003

1/ Marketing years are as follows: September-August in Syria, Italy, and the United States; and October-September in Greece and Turkey.

Note: U.S. Census Bureau export figures do not match these table data due to variations in actual dates of shipments.

Source: Horticultural Products Review, FAS, USDA.

Table 28--Walnuts: Production, supply, and distribution, by country, 1988/89-1990/91

Country	Marketing year 1/	Beginning stocks	Production	Imports	Total supply	Exports	Domestic consumption	Ending stocks	Total distribution
--Metric tons (in-shell basis)--									
China (Mainland)	1988/89	0	177,100	0	177,100	54,820	122,280	0	177,100
	1989/90	0	160,050	0	160,050	51,000	109,050	0	160,050
	1990/91	0	190,000	0	190,000	63,000	127,000	0	190,000
France	1988/89	0	21,500	11,400	32,900	10,900	22,000	0	32,900
	1989/90	0	26,200	6,900	33,100	11,200	16,900	5,000	33,100
	1990/91	5,000	26,000	5,000	36,000	11,500	21,500	3,000	36,000
India	1988/89	1,480	18,000	0	19,480	10,000	8,500	980	19,480
	1989/90	980	17,000	0	17,980	8,500	9,000	480	17,980
	1990/91	480	20,000	0	20,480	10,000	9,800	680	20,480
Italy	1988/89	5,500	11,000	9,327	25,827	2,314	22,013	1,500	25,827
	1989/90	1,500	18,000	8,800	28,300	5,200	22,500	600	28,300
	1990/91	600	18,000	9,000	27,600	3,000	23,000	1,600	27,600
Turkey	1988/89	6,000	64,000	0	70,000	4,000	61,000	5,000	70,000
	1989/90	5,000	62,000	0	67,000	3,000	60,000	4,000	67,000
	1990/91	4,000	63,000	0	67,000	2,000	61,000	4,000	67,000
United States	1988/89	66,498	189,600	180	256,278	77,343	127,752	51,183	256,278
	1989/90	51,183	207,800	181	259,164	85,307	112,643	61,214	259,164
	1990/91	61,214	204,100	100	265,414	86,000	131,414	48,000	265,414
Totals	1988/89	79,478	481,200	20,907	581,585	159,377	363,545	58,663	581,585
	1989/90	58,663	491,050	15,881	565,594	164,207	330,093	71,294	565,594
	1990/91	71,294	521,100	14,100	606,494	175,500	373,714	57,280	606,494

1/ Marketing years are as follows: August-July in the United States; September-August in Italy, Syria, and Turkey; October-September in China, France, and India.

Note: U.S. Census Bureau export figures do not match these table data due to variations in actual dates of shipments.

Source: Horticultural Products Review, FAS, USDA.

The Demand for Fresh Fruit

by

Gary D. Thompson, Neilson C. Conklin and Gabriele Dono*

Abstract: A nonlinear Almost Ideal Demand System (AIDS) was estimated to obtain more insight into factors that explain the changes that have occurred over time in U.S. fruit consumption. Own and cross price elasticities and expenditure elasticities were estimated for fresh apples, bananas, oranges, grapefruit, grapes, and strawberries. The findings indicate that changes in fruit consumption result primarily from changes in prices, income, and demographics, rather than changes in consumer preferences. Grapes, oranges, and grapefruit had the largest own price elasticities of the fruits considered. Bananas substituted for all other fruit, and grapefruit substituted for grapes and strawberries, and vice versa.

Keywords: *Fruit demand, demand elasticities, demand system, fruit consumption.*

Introduction

Per capita fresh fruit consumption in the United States has grown over the last two decades, in spite of increased real fruit prices (figure A-1). The mixture in the consumer's fruit basket has also changed. Consumption of fresh oranges and grapefruit has declined while consumption of bananas, grapes and strawberries has increased substantially (figure A-2). This could be the result of changes in consumers' preferences, but changes in income, demographic characteristics, and relative prices (often a result of supply condi-

tions) are also potential sources of varying consumption patterns.

The cause of these changes in fruit consumption is important to producers, marketers, and policymakers. If changes in tastes and preferences are the primary force behind trends in fruit consumption, then industry investment in generic advertising might have a high payoff in increasing demand for targeted commodities. However, if price and income changes are the primary cause of consumption changes, investment in new technologies that would lower production and marketing costs would increase fruit sales by reducing

retail prices. This article presents the results of a fruit demand model designed to examine the causes of changing fruit consumption.

Analysis of Fresh Fruit Demand

The approach used to analyze fruit demand in this study incorporates three stages of consumer decisions. In the first stage, consumers allocate their income between food and other categories of goods, including services, durables, food, and other nondurables. In the second stage, consumers further allocate the income allocated for food among major food groups, including the fresh fruit in this study—apples, bananas, oranges, grapefruits, strawberries, and grapes. In the third stage, consumers finally allocate the portion of their income spent on fruit among these six fruits. Within this general framework, a combination of nonparametric and parametric tests were employed to identify and estimate the fruit demand system.

Tests for changes in consumer preferences examine price and quantity data

Figure A-1

Fresh Fruit Consumption per Capita, Real Income per Capita, and Fresh Fruit Price



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to see if consumers' decisions, over time, are consistent with utility maximization (see Appendix A). The fruit demand data (Appendix B) revealed no inconsistencies in consumer choices, indicating that consumer preferences for fruit have remained stable over the last two decades. If preferences have remained stable, what explains the changes that have occurred in fruit consumption?

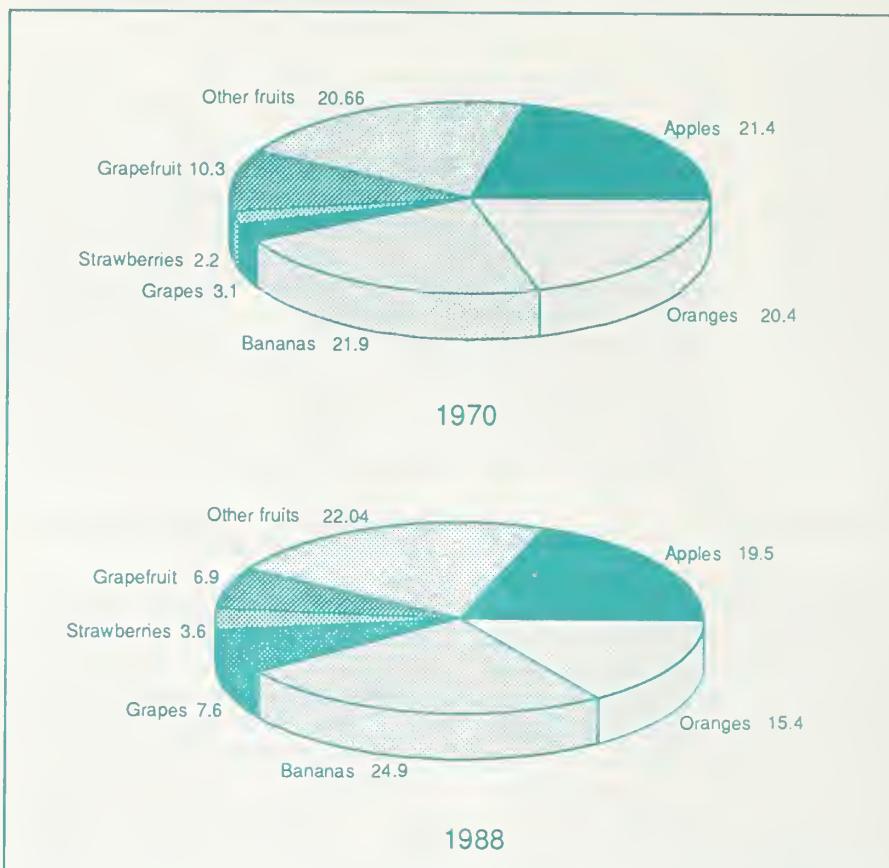
To obtain more insights into this question, the fruit demand system was estimated using a variety of specifications (see (8) for detailed results). The nonlinear Almost Ideal Demand System (AIDS) gave the best results (1). In addition to price and income variables, the models included a demographic variable (the number of married women entering the work force), and a variable to account for changes in income distribution (Appendix C). Estimated coefficients for the budget share system of five equations are presented in table A-1.

Price and expenditure elasticities—the percentage change in quantity demanded resulting from a 1-percent variation in price or expenditures—are presented in figure A-2.¹ The own price elasticities for apples, bananas, and strawberries appear to be relatively small, indicating that retail demand is relatively unresponsive to price changes. Cross price elasticities indicate that bananas are a substitute for all other fresh fruits, although its cross price elasticity with strawberries is nearly zero—suggesting that bananas and strawberries are not used as substitutes for one another nor usually used together. Grapes and strawberries substitute for grapefruit and vice versa, suggesting that these three fruits compete with each other as their relative prices fluctuate.

The approximate food expenditure elasticities for individual fruits, given changes in total expenditure, reflect the allocation to food (stage 2) and to goods

¹The equations giving price elasticities are nonlinear in the estimated coefficients. Thus, exact standard errors or confidence intervals cannot be calculated using the estimated standard errors of the coefficients in the nonlinear AIDS model.

Figure A-2
Changing Shares of Fresh Fruit Consumption



(stage 1). The expenditure elasticities, calculated at values at the beginning and end of the sample, demonstrate the relative stability of expenditure elasticities. The approximate food expenditure elasticities for individual fruits, given changes in total expenditure, reflect the allocation to food (stage 2) and to goods (stage 1). The expenditure elasticities, calculated at values at the beginning and end of the sample, demonstrate the relative stability of expenditure elasticities for fruit: over the 19-year period, most expenditure elasticities changed by less than 10 percent (table A-3). The expenditure elasticity for grapes varied the most over the sample period, declining 25 percent to a value of 1.083 in 1988.

The price and expenditure elasticities presented in this study are not exactly comparable to those of other studies because of the period of analysis (1970-1988) and the nature of the models used. Huang's study, which estimated elasticities for some of the same fresh fruits for

the period 1953-1983, appears to be the most comparable (2). The own price elasticities for oranges (-0.9996) and grapes (-1.3780) in Huang were larger than those for other fresh fruits. A similar pattern in own price elasticities from the present study emerges from table A-2. The substitution relationships reflected by the cross price elasticities differ between Huang and the present study. For example, Huang found apples substituted for oranges, bananas, and grapes, whereas in the present study no evidence of apple substitution is found. The consistent substitution of grapes and grapefruit found in the study did not appear in Huang.

The most striking differences between the two studies regard expenditure elasticities. The food expenditure elasticities in table A-3 most closely correspond to Huang's expenditure elasticities. Huang determined that apples and bananas were inferior goods, i.e., having negative expenditure elasticities, while expenditure elasticities

Table A-1--Maximum likelihood estimates of the symmetric, homogenous nonlinear AIDS model

Dependent variable (Quantity)	Independent variables (prices) 1/							Fruit expenditure	Demographic
	Intercept	Apples	Bananas	Oranges	Grapefruit	Grapes			
Apples	0.394 (11.270)	0.261 (7.728)	2/ -0.055 (-2.066)	-0.083 (-6.165)	-0.055 (-4.528)	-0.055 (-2.365)	0.025 (0.920)	-0.058 (-1.577)	
Bananas	0.190 (6.754)		0.124 (4.413)	-0.011 (-0.948)	-0.007 (-0.652)	-0.019 (-1.026)	0.174 (6.011)	0.032 (1.137)	
Oranges	0.301 (17.254)			0.096 (8.267)	-0.007 (-0.971)	0.001 (0.794)	-0.116 (-3.519)	-0.128 (-7.323)	
Grapefruit	0.161 (10.735)				0.039 (5.198)	0.025 (2.257)	-0.027 (-1.650)	-0.081 (-5.415)	
Grapes	-0.056 (-1.952)					0.049 (2.009)	-0.074 (-2.284)	0.186 (6.304)	

1/ All fruit variables are expressed as natural logarithms of prices.

2/ Due to symmetry, the lower, off-diagonal elasticities are omitted.

Note: t values are in parenthesis.

Table A-2--Uncompensated price, total expenditure and demographic elasticities evaluated at sample means
(symmetric, homogeneous AIDS model)

Commodity	Apples 1/	Bananas	Oranges	Grapefruit	Grapes	Strawberries	Fruit expenditure	Demographic
Apples	-0.167	-0.115	-0.201	-0.126	-0.122	-0.004	0.366	1/ -0.085 (0.067)
Bananas	0.117	-0.141	0.194	0.131	0.120	-0.004	0.069	0.169 (0.063)
Oranges	-0.807	-0.330	-0.719	-0.221	-0.164	-0.197	0.647	-0.449 (0.068)
Grapefruit	-0.693	-0.101	-0.090	-0.523	0.293	0.059	0.408	-0.542 (0.102)
Grapes	-0.626	-0.288	-0.058	0.105	-0.745	-0.135	0.611	0.689 (0.124)
Strawberries	-0.286	-0.588	-0.119	0.073	-0.192	-0.066	0.445	2/ 0.447

1/ Linear approximations to standard errors using the procedure given in Krinsky and Robb in parenthesis.

2/ Standard errors cannot be calculated for omitted equations in each system.

Table A-3--Percent change in consumption of selected fruits for a 1-percent change in expenditures
for all goods, for various years
(symmetric, homogeneous AIDS models)

Years	Expenditure elasticities					
	Apples	Bananas	Oranges	Grapefruit	Grapes	Strawberries
1970	0.388	0.065	0.652	0.430	0.767	0.471
1979	0.369	0.115	0.651	0.414	0.654	0.456
1988	0.350	0.057	0.573	0.563	0.494	0.385
Net change	-0.068	-0.008	-0.078	-0.067	-0.273	-0.086

for oranges, grapefruit, and grapes all displayed values of about 0.45. By contrast, in the present study none of the fruits was an inferior good, although bananas displayed a small expenditure elasticity. Expenditure elasticities for grapes and oranges were larger than the expenditure elasticities for other fruits. The relatively lower values of expenditure elasticities in Huang's study may be partially attributed to the fact that his system did not include variables for income distribution or demographic changes.

Implications of the Empirical Analysis

An important result from this study is the conclusion that changes in fruit consumption result primarily from changes in prices, income, and demographics, rather than from changes in consumer preferences.

A second important result of the study is that grapes, oranges, and grapefruit have the largest own price elasticities, suggesting that consumers' purchases are most price sensitive for those fruits. Accordingly, higher production and marketing costs, which translate into higher retail prices, will cause relatively large adjustments in the quantity of those fruits consumed.

Although most fresh fruits are complements, two significant substitution relationships appear: bananas substitute for all other fruits; and grapefruit substitute for grapes and strawberries, and vice versa. Bananas are an attractive substitute for all fruits because of their year-round availability and price stability throughout the year. Increased production of strawberries in California, coupled with growing imports of grapes from the Southern Hemisphere, have caused more direct seasonal competition with grapefruit during winter months. Thus, significant substitution between these three products would be expected due to the enhanced availability of grapes and strawberries throughout the year.

Macroeconomic growth resulting in larger disposable incomes for consumers generally implies that fresh fruit consumption will continue to grow. Although producers and marketers likely consider macroeconomic events

as strictly exogenous, expectations of economic growth should provide very favorable market conditions for fresh fruit, to the extent that disposable income influences aggregate consumption.

Income distribution clearly affects the demand for fresh fruits. Taking distribution into account results in less extreme estimates of expenditure elasticities (8). These results imply that consumers with higher incomes do not adjust as drastically as would be indicated by expenditure elasticities based only on mean income. Hence, advertising campaigns designed specifically to target higher income groups may not have the significant effect on product sales that would be predicted if income distribution were ignored.

The entrance of married women with children into the labor force has apparently enhanced the value of convenience of some fresh fruits. Citrus fruit consumption declines as married women with children enter the labor force, while consumption of grapes and strawberries is affected positively. The convenience of simply washing and eating fruits, such as grapes, becomes more important as the cost of time spent preparing food increases for working parents.

Consumption patterns for major fresh fruits have changed markedly during the past two decades. Yet the most significant factors driving these changes in fruit demand have been changes in relative fruit prices, disposable income, and the demographic composition of the population. Relatively stable consumer tastes over the past two decades have not been the source of changing consumption patterns. The factors causing changes in fresh fruit demand have important implications for the well-being of the fresh fruit industry and for agricultural policy.

Appendix A

Nonparametric Tests

Consumer theory usually assumes that consumers maximize a utility function, subject to a budget constraint. Application of the calculus to the utility maximization problem gives the familiar marginal conditions equating price

ratios to rates of marginal substitution. Rather than using well-defined but theoretical functions for analyzing consumer behavior, nonparametric testing procedures utilize observed price and quantity combinations to make inferences concerning consumption patterns. Nonparametric tests require no assumptions regarding a particular function to represent utility. Instead, these tests compare consumer expenditures in different periods using the theory of revealed preference (13).

The nonparametric tests for examining revealed preferences use observations on prices and quantities of goods to see if consumers' preferences are consistent over time. For example, a consumption bundle of fruit in 1988 would be revealed preferred to a similar bundle in 1987, if the total fruit expenditure in 1988 (at 1988 prices) exceeded the hypothetical expenditure for fruit given in the 1987 bundle (valued at 1988 prices). This revealed preferred relationship simply means that consumers must be better off by consuming more fruit (the 1988 bundle) at fixed prices (1988 prices). Revealed preference orderings should be transitive, that is, if the bundle of fruit consumed in 1988 is revealed preferred to that of 1987, and the 1987 bundle is revealed preferred to the 1986 bundle, then the 1988 bundle must be revealed preferred to the 1986 bundle. Consumer preferences are deemed stable if all combinations of expenditures are consistent with this transitive ordering. A violation of the revealed preference ordering would occur if, for example, at 1987 prices, the 1987 fruit bundle were revealed preferred to the 1988 bundle. Such a violation would suggest that consumer preferences are not consistent, indicating that consumer preferences had changed. A menu-driven software routine is available to perform these comparisons (13).

One advantage of the nonparametric testing procedure is that it may be applied to small data sets having insufficient observations to justify regression analysis. Secondly, the test results are not conditioned by the choice of functional form for the parametric model.

This nonparametric test has one drawback. If real disposable income has been continuously increasing through

time, detecting violations in revealed preferences may be difficult. In this case, consumers would be purchasing increased quantities as their budget constraint shifts outward, so that the possibility of violating transitivity in revealed preference orderings is reduced. Note, however, that from 1970-1988, real disposable per capita income declined in 6 of 19 years—1974-75 and 1979-82 (see figure A-1).

The nonparametric tests used to detect stability in consumer preferences differ from commonly used parametric techniques that are based on standard statistical methods such as multiple regression analysis. Rather than assuming that a particular function can be fit to a set of observations on prices and quantities, nonparametric tests check algebraic relationships between price and quantity combinations. No standard errors are associated with the results of nonparametric tests: either the algebraic conditions are satisfied or they are not. Hence, the nonparametric results are not completely analogous to hypothesis test results of classical statistics.

Appendix B

Data

The data consist of annual observations (from 1970-1988) on prices and quantities consumed of fresh fruit products, meats, vegetables, milk, other food items, and nonfood items, divided into other nondurables (exclusive of food), durables, and services. Quantities of six fresh fruits—apples, bananas, oranges, grapefruits, strawberries and grapes—were obtained from *Fruit and Tree Nuts Situation and Outlook Yearbook* (9). These six fresh fruit quantities account for over 80 percent of U.S. fresh fruit consumption.

Retail prices for the six fruits were constructed from Bureau of Labor Statistics (BLS) data and deflated by the CPI-U (U.S. Department of Labor) (11). Average prices for the fruits were computed from monthly prices when the fruits were available at retail outlets. Orange prices were calculated as averages of Valencia and navel varieties, while grape prices were averaged for Thompson Seedless and Emperor varieties. During the latter part of 1978 and 1979, BLS suspended the collection of prices

for grapefruit, grapes and strawberries. Price observations were constructed by regressing retail prices on farm-gate prices and inserting the predicted values for the missing data points. This is consistent with the procedure used by Huang in a previous demand analysis (2).

Quantities of nonfood items were constructed by dividing the expenditure for the particular category (durables, nondurables, and services) by the corresponding price index. Income distribution data by quintiles were obtained from the Bureau of Census, P-60 series (Department of Commerce) (10). The demographic variable included in the model, as a proxy for the opportunity cost of time spent shopping and preparing food, was the percentage of ever-married women entering the labor force with children 18 years or younger.

Appendix C

The Estimated Model

Parametric models for estimating consumer demand can be derived in various ways, but the utility maximization problem is generally the starting point for deriving such models. The model estimated here is derived theoretically by solving the utility maximization problem for optimal quantities consumed, and then substituting those quantities into the utility function to obtain an indirect utility function. Given the indirect utility function, Roy's identity can be used to derive demand share equations in which expenditure shares are functions of prices and income or expenditures. The parametric model used for estimating consumer demands at each of the three stages is based on Deaton and Muellbauer's Almost Ideal Demand System (AIDS). This AIDS model was chosen as the statistically appropriate special case of a more general model given in Lewbel (4).

Market demands are estimated by aggregating across consumers who have different incomes and demographic attributes. When aggregating across consumers with different incomes, a measure of the distribution of income must be included in the model. The measure included in the estimated model is Theil's entropy measure, which takes on larger values as the

distribution of income becomes more skewed towards higher income brackets. The demographic attribute included in the model is the proportion of ever-married women entering the labor force with children 18 years and under. This particular demographic variable is included as a proxy for the opportunity cost of time spent shopping and preparing meals at home. The estimated AIDS model, which was modified to include an income distribution measure and a demographic variable, is specified as

$$w_i = a_i D_i + \sum_{j=1}^N c_{ij} p_j + b_i \left(d + \sum_{i=1}^N a_i p_i D + 0.5 \sum_{i=1}^N \sum_{j=1}^N c_{ij} p_i p_j \right) - b_i \ln x^0 + e_i$$

i, j = the number of goods

where w_i is the expenditure share of a good, p_i represents the natural logarithm of each good's price, x^0 is mean expenditure in natural logarithms plus Thiel's entropy measure of income distribution, D is the demographic variable, and e_i is the error term. This set of expenditure-share equations is estimated using maximum likelihood techniques, where one equation in the system must be omitted due to singularity of the contemporaneous covariance matrix.

References

1. Deaton A. and Muellbauer J. "An Almost Ideal Demand System," *Amer. Econ. Rev.* 70(1980a):312-326.
2. Huang, Kuo S., *U.S. Demand for Food: A Complete System of Price and Income Effects*, U.S.D.A., Economic Research Service, Technical Bulletin No. 1714, December 1985.
3. Krinsley, Itzhak and A. Leslie Robb. "On Approximating the Statistical Properties of Elasticities: A Correction", *Rev. Econ. Stat.* 72(1990):189-190.
4. Lewbel, Arthur. "Nesting the AIDS and Translog Demand System," *International Econ. Rev.* 3(1989):349-356.

5. Manser, Marilyn. "Elasticities of Demand for Food: An Analysis Using Non-Additive Utility Functions Allowing for Habit Formation," *Southern Econ. J.* 43(1976):879-891.
6. Powers, Nicholas J. "Federal Marketing Orders for Fruits, Vegetables, Nuts, and Specialty Crops," U.S. Department of Agriculture, Economic Research Service, Agricultural Economic Report Number 629, March 1990.
7. The Packer, "Fresh Trends '90: A Profile of Fresh Produce Consumers," *Focus 1989-90*, Overland Park, Kansas: Vance Publishing Corp, 1989.
8. Thompson, Gary and Gabriele Dono, "Explaining Changes in U.S. Consumption of Fresh Fruit," Department of Agricultural Economics, The University of Arizona, Working Paper No. 63, 1990.
9. U.S. Department of Agriculture, *Fruit and Tree Nuts Situation and Outlook Yearbook*, Economic Research Service, TFS-250, Washington, D.C., August 1989.
10. U.S. Department of Commerce, Bureau of the Census, *Current Population Reports, Consumer Income*, Series P-60, No. 162, February 1989.
11. U.S. Department of Labor, *Handbook of Labor Statistics*, Bureau of Labor Statistics, Bulletin 2340, August 1989.
12. Varian H.R. "The Non-Parametric Approach to Demand Analysis," *Econometrica*, 50(1982):945-973.
13. Varian, H.R. and Lee Reddy, *Nonpar Software*, version 07-22-85.

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